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Editorial Notes

Keeping Pace with Development

THERE is not, or should not be, any standing still in the Gas Industry, and it is this continual change in conditions, this constant growth, which makes the work of a gas engineer so interesting and at times not a little difficult. Since the War the town of Ipswich has developed in steady, if not particularly spectacular, fashion, and in consonance the services of the Ipswich Gas Light Company have expanded and have been greatly improved. An account of how the Company coped with a yearly increase in gas sales of 4 to 5% since 1919, and with the more exacting requirements of its consumers, was given by Mr. W. J. C. Garrard at the autumn meeting of the Eastern Counties Gas Engineers' and Managers' Association; and his Paper, which is published in the "JOURNAL" to-day, is an interesting record of solid achievement on the works, on the district, and on the selling and service side. In both manufacture and distribution Ipswich has shown the pioneering spirit. It was one of the first companies to install continuous vertical retorts, and, as is well known, the first waterless holder in the British Isles was erected at Ipswich.

The outline given by Mr. Garrard of the history of the continuous vertical plant at Ipswich shows once again how developments have enabled a greatly increased output of gas to be obtained on the same ground space. Actually, practically double the amount of gas can be obtained from the retort house that was possibly twenty years ago. And in regard to the working of the plant we commend the care taken at Ipswich to ensure tightness of the retorts. After each scurfing, spraying with cement is carried out, and before the retort is put to work again it is subjected to pressure by opening the carbon monoxide tiles and closing the control tiles; any leak is thereby made visible. Thoroughness would appear to mark all the activities of the Ipswich Gas Company. As example we may cite the complete coke conveying, screening, and loading plant which was erected last year, which should prove a great saving in repairs and maintenance and which has reduced the loading time of lorries by at least 50% to the advantage of coke merchants as well as the Company's own distribution system. Distribution is carried out jointly between the two, and in connexion with the undertaking's own direct trade, sale in 1s. bags has proved immensely popular—due to insistence on a product of high quality, regular and courteous service, and intelligent advertising. This regularity of service, the fact that the housewife can rely on getting her supply on the same day each week, is most important.

Adequate pressures at all parts of the distribution system have been assured by the laying of a high-pressure ring main which can feed into the inner district as well as supply a rapidly developing outer area. Mr. Garrard gave the salient points in the development of this distribution system. He also explained the steps the Company took in 1933-34 in erecting cooker repair and renovating shops. Old black cookers, to the tune now of over 17,000, have been returned on hire "resplendent in their new grey finish, with vitreous enamelled doors and cornices." Mr. Garrard described this as a "bold" step; we should regard it as a very necessary one. Perhaps an even bolder step—that of scrapping the old black cookers and supplying only modern appliances with thermostatic control—would, if practicable, in the long run have proved better, but we will not argue this matter. At all events, we are assured by the Author that the step has stopped the installation of many electric cookers, and we feel that "Keeping Ahead at Ipswich" was a happy and appropriate title for a Paper quiet in tone but containing a great deal of practical wisdom and indicating the determination of the Ipswich Company to keep its works and distribution system in first-rate working order and its sales service thoroughly up to date.

Education

THE Western Juniors were lucky when, at the opening meeting of their new session, they were addressed by the President of The Institution of Gas Engineers, Mr. Robert Robertson. They were fortunate in that the President was with them to encourage them in, and to show appreciation of, their work, the standard and importance of which increases year by year. They were fortunate, too, in the substance of the Address, which had so obviously involved much thought. It is published in full in our pages to-day.

The subject chosen was education, appropriate enough in the circumstances in which the Address was given. The problem of education is a vital one to the Gas Industry, and as far as the internal affairs of the Industry are concerned the problem has been tackled with conspicuous success. The

beneficial effects of the Institution Education Scheme have already been felt, and its influence will become more and more pronounced as time goes on. Mr. Robertson naturally spoke about the Scheme and its latest amendments, but before turning to this specific plan he discussed education and educational systems in their widest sense and in an extraordinarily interesting manner. He reviewed education in theory and education in practice. He touched upon what may be termed ornamental education and what may be classed as "useful," on the happy mean between the two, on vocational training, and, in general, on methods of education.

Regarding methods there has of late years been much talk, much controversy, on the merits or otherwise of the examination system. Opinion differs widely on the written examination as a means of measuring results and the application of these to the solution of that most difficult of after-school problems—the placing of the ex-scholar in the occupation for which he is best suited. Some have a flair for examinations, a flair for memorizing sets of data, and the like, and manipulating these in certain conventional ways. They may be successful in their examinations, but does this success give indication of the student's ability to make use of the knowledge required in any particular direction? And does the conventional examination take cognizance of the mental and psychological reactions which the atmosphere of the examination room is liable to produce in certain types of student? These questions, it will be agreed, are difficult to answer, and it may be asked, Why not an oral examination? This requires great skill and discrimination on the part of the examiner; without these the results may prove most unreliable. A combination of the two, however, may well serve as a useful indication of the capacity of the student and his manner of approach to the problems put to him. And, as Mr. Robertson said, there is no bar to the unsuccessful student being eminently successful in after life or guarantee against the successful one proving a failure.

Remuneration

To-day, as we have emphasized before, as high a standard of training is required for the supply side as for the manufacturing side. This has been recognized by those responsible for the Institution Education Scheme, but the view cannot be generally held in the Industry; otherwise there would be a larger number of candidates for the Diploma in Gas Engineering (Supply). At the Research Meeting of the Institution to-day 17 Diplomas are to be presented. Only one of these, however, is a Diploma in Gas Engineering Supply; all the rest are for manufacture. At a time when specialization is of more importance in the Industry than ever before this is disheartening. In the larger works specialization has become an essential feature of the Industry. Production, distribution, utilization, and service have to an extent become separate professions, and within them in turn there are phases of work for which special knowledge, training, and aptitude are required. Amalgamation and group control will reduce the number of positions of full individual responsibility; it is also bound to increase the number of key positions where specialized training and a high standard of education are essential. Again, for positions of administrative responsibility a knowledge of business management is important; and in this connexion it is only a few weeks since we referred to the progress of the Department of Business Administration which was established at the London School of Economics in the University of London eight years ago. In this scheme a firm selects a graduate for appointment, requiring him first of all to undertake and complete a course of Business Training at the School.

Conditions in the Gas Industry have changed. A high standard of general education, specialized training, and quick adaptability are required of the recruits to the higher personnel of the Industry, and the Industry should be prepared to remunerate on a scale which will not only attract but retain suitable men. It is on this note that Mr. Robertson concluded his Address. "Judging from the scale of salaries offered in connexion with recent appointments advertised," he observed, "this [*i.e.*, the obligation of adequate remuneration] is not always appreciated by those responsible, and the results cannot but be harmful to the undertakings concerned and to the Industry generally. It is equally true, however, that the junior who fails to live up to the claims made in his application is to blame for this state of affairs, just as much as the undertaking which, systematically, under-estimates the value of services rendered."

Pure Research on Coal

The Melchett Medallist's Address delivered to the Institute of Fuel this year by Professor Wheeler was in some respects a *tour de force*. It was a distinct achievement to discuss and make intelligible the constitution of coal as disclosed by the single line of research of "destructive distillation," without reference to most of the other lines of research. Destructive distillation as understood by these investigators is very different from the same process as practised in industry. Temperatures are retained constant for days and weeks on end, or they may rise by perhaps 25° per week. The gaseous and more particularly the liquid products are collected and submitted to analysis in order to draw deductions. Yet it is curious to reflect that this line of research was begun, continued, but not yet ended, because of the very practical desire to reduce the incidence of explosions in coal mines. Because it was first believed that distillation with evolution of combustible gas must precede explosions of coal dust, some simple experiments were begun upon the character of the gases that are evolved when coal is distilled at the lowest possible temperatures. From that it was only a step for a born experimentalist like Professor Wheeler to follow the line of research thus begun by using the information obtained by destructive distillation to deduce the constitution of coal.

There was, however, one gap that we waited in vain for the Professor to fill. It was approached in the last two paragraphs of the Paper, but the horse that the Professor was riding appeared to refuse the jump—or perhaps did not even realize that the obstacle, which looms so large to our uninstructed mind, was there. Professor Wheeler remarked that the specific application of the work had been to two problems of safety in coal mines: Coal dust explosions and the spontaneous combustion of coal. Later, at the end of the lecture, there occur these words: "When I am asked what particular research on coal would be of most *practical* value to those who desire to sell it, equally with those who have to use it, I have no hesitation in saying: Research on the composition of coal." The italic is ours. How far can this dictum be justified? How far is it the product of the Author's justifiable enthusiasm for his subject?

We will agree that knowledge of the constitution of coal is of fundamental importance in certain directions, especially for processes such as hydrogenation, and is thus a very proper subject for research in University laboratories where the post-graduate students live and move and have their being. But engineers and practical carbonizers have propounded to us

the question: "In what ways have the practical treatment of coal in the boiler, in the gas-works retort, in the domestic grate, or in the coke oven been influenced by knowledge of the constitution of coal?" We cannot answer them. Such developments as have occurred in carbonizing practice, and even in coal blending, have arisen from experiments on the trial and error principle (or from its first cousin "experience") and not because of any knowledge of the constitution of coal. If Professor Wheeler could have told us in what respect mining practice underground has been guided by a knowledge of this subject, this hurdle might be safely left behind. Some correlation between the research and its practical applications would have added immensely to the value of the Address.

Problems to be Elucidated

THE account of the work given by Professor Wheeler was fascinating in the extreme, showing how stage by stage new discoveries were made. The general conclusions are somewhat as follows: Peat consists of plant remains permeated by structureless bodies known as ulmins, which are soluble in alkalis. When the peat has become coal, the ulmins have ceased to be soluble in alkalis, and comprise most of the structureless portion of the coal. Vitrain consists almost wholly of ulmins; clarain (which with vitrain makes up the bright bands of the coal) consists of plant remains in small quantities embedded in this structureless material. Durain, the dull coal, is far richer in plant remains. The structureless portion of the coal consists of ulmins principally, with some free hydrocarbons and some resins, the remainder of the coal consisting of structured plant entities. On distillation, the free hydrocarbons distil largely unchanged between 225° and 300° C., the slight decomposition which occurs giving rise to paraffins. Between 300° and 325° C. the plant remains decomposed, yielding gases rich in oxides of carbon, and liquids equivalent to some 30% of the plant remains by weight, comprising water and much heavy oil containing mainly unsaturated hydrocarbons and neutral oxygenated compounds.

Immediately after this stage, from 325° to 375° C. the resins distil, apparently without a great deal of decomposition, giving rise to some gases consisting of paraffins and higher olefines and to a good deal of liquid product nearly equal in weight to the resins initially present in the coal, consisting of resins and unsaturated hydrocarbons. During all this stage, from 300° to 365° C. the ulmins have been decomposing, the initial decomposition temperature depending upon the character of the coal. This decomposition ceases to evolve oil by 400° C. and gives rise to gases consisting of oxides of carbon and paraffins, together with oils consisting of phenols, acidic oils, unsaturated hydrocarbons, with aromatic and hydroaromatic hydrocarbons. When the distillation is conducted according to industrial rates of heating, these decompositions are not completed within the temperature ranges given and overlap with extension to higher temperatures than the maxima just given. Obviously there will be more superheating and therefore more decomposition in practice than in the slow-heating laboratory experiments.

It will also be observed that these experiments refer to the primary products of carbonization, which are much cracked in practice to yield gases. The research up to the present time has not concerned itself with another very important problem—namely, the nature of the decomposition products which are left behind when the plant remains and the ulmins decompose. Other lines of research are necessary to elucidate those problems, and for the information of those interested it is only necessary for us to refer to the work of the Coal Research Laboratory of the Carnegie Institute of Technology which was briefly described in the "JOURNAL" of Jan. 12 last, p. 106, and to the late Professor Bone's letter in the subsequent issue. For still higher temperatures there is the work of Professor Riley at Newcastle, an account of which was given in the "JOURNAL" of Sept. 1, 1937, p. 522. The work that is going on in many parts of the world appears likely to present to us a complete picture of the carbonization process. It may be that our engineering friends are right and that no practical use has yet been made of this information. If that be so, the time is surely approaching when the combined intelligence of practical technologists and research workers must be directed to improving practice, if that be possible, on the basis of the latest knowledge of the constitution of coal and its behaviour under the action of heat.

Smoke

EARLY in October we commented upon the Gas Industry's tie-up with the booklet issued by the National Smoke Abatement Society and we remarked that this crystallization of the subject gives new hope to a cause which has always appeared to be struggling against enormous odds. We added that where the Gas Industry can come in is in pointing out remedies for the state of affairs which are available to every home.

It happened that at about the time when those words were published another aspect of this smoke problem was being discussed by Dr. Lessing in his Chairman's Address to the London Section of the Society of Chemical Industry. It has been made abundantly clear ever since 1929, when a successful action was fought against the Manchester Corporation Electricity Department for damage to land injured by sulphur dioxide, that this problem of sulphur dioxide must come to the fore. Smoke does a deal of harm to health, but small quantities of sulphur dioxide in the air will increase the rate of atmospheric corrosion very greatly. Dr. Lessing pointed out that the sulphur which is evolved over Greater London annually is equivalent to 500,000 tons of sulphuric acid. That is an immense quantity and must cause untold damage to property and to works. How much would it save London if this emission were stopped? Suppose it cost 2s. per ton of coal burned to stop it, would the manufacturers get that back in decreased repair and maintenance costs? If, simultaneously, the emission of smoke were prevented, how much more would they get back in the increased health of their workers, less absenteeism from colds and respiratory diseases, and longer useful working life of their older and more experienced employees? In an almost hidden sentence of his Paper, Dr. Lessing gave the key to the solution of the problem.

Before discussing the solution, it is necessary to see for a moment what Dr. Lessing and his colleagues have achieved. At Battersea, there is a process of sulphur removal which is applicable perhaps nowhere else. It involves the use of huge volumes of river water, and it uses quite a large proportion of the alkalinity of the natural water to neutralize the sulphur acids. A second such station would make the Thames acid—and that would never do. One can imagine the stink that would arise, metaphorically and olfactorially, if any great industrial river were ever acidified. The ships would pass into solution, the bacteria which purify the waters would die, gases now mercifully combined would be liberated. Obviously there can be no second station like Battersea. Dr. Lessing described the stages by which a long and arduous research, which reflects the highest credit upon all who took

part in it, evolved a new process that recovers nearly 100% of the sulphur contained in the flue gases. This process has the important feature that *no effluent is produced.* It is self-contained save for the introduction of lime and can therefore be used anywhere. According to his figures the cost at Fulham will be of the order of 1s. 6d. to 2s. per ton of coal burnt and may later be converted from a cost into a profit. It is not necessary here to discuss the means by which this astonishing result was secured. The important fact is that a process that is generally applicable technically has been discovered.

Now we come to the general solution of the smoke and sulphur problem. In his Paper Dr. Lessing refers to the annual discharge of sulphur over Greater London of 500,000 tons of sulphuric acid. He does not suggest, as many would, that his process might be applied to every boiler house and factory chimney. He points out instead that when the Fulham and Battersea stations are completed, they will evolve in the flue gases sulphur amounting to 50,000 tons, no less than 10% of the total quantity now discharged over Greater London. "It is therefore shown," he says, "that a very material abatement of acid pollution, which automatically carries with it a corresponding reduction in the emission of dust and smoke, can be effected by applying flue gas washing methods to a relatively small number of point sources at which combustion takes place on a large scale."

Personal

Colonel J. R. GOODWIN and Mrs. Goodwin celebrated their diamond wedding last week. Colonel Goodwin, who is 85 years of age, is the senior member of the Board of Directors of the Kidderminster Gas Company. He was appointed a Justice of the Peace for the Borough in 1893.

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Mr. ROBERT W. COWIE, Joint Manager with his father of the Hawick Gas Company, was married on Oct. 24 in Orrock Church, Hawick, to Miss Winifred Scott, daughter of the late Mr. Tom Scott, Hawick, and Mrs. Scott. The reception in the Crown Hotel was attended by over 80 guests and the bride and bridegroom received over 260 presents, including a writing bureau from the employees at the Gas-Works.

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After twenty years' service with the Bradford Corporation Gas Department, Mr. WILLIAM E. SETTLE has retired from the position of Assistant Works Superintendent. He has taken an appointment as representative of Messrs. John E. Williams & Co., Ltd., of Partington, near Manchester.

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Mr. W. HIND, Industrial Gas Expert, City of Coventry Gas Department, has resigned his appointment in order to commence a furnace manufacturing business under the title of Hind-Griffiths Furnaces, Ltd., situated in Rolfe Street, Smethwick. Mr. Hind has been in charge of the industrial gas department at Coventry since its inception, and during his time the load has increased by approximately 500 million cu.ft. per annum.

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Mr. WILLIAM DOUGALL, B.Sc. (Leeds), has been appointed to the staff of the Plymouth and Stonehouse Gas Light and Coke Company. Mr. Dougall was born at Wellington, New Zealand, where his father was Engineer to the Gas Company. Mr. Dougall is a grandson of the late Archibald Dougall, and a nephew of Mr. Percy Dougall.

Obituary

The death has occurred of Mr. JAMES KAY, Engineer and Manager to the Elgin Gas Department for thirty years. He was a native of the town and was associated with the Gas Undertaking there for forty-five years, retiring in 1929. He was seventy-eight years old.

* * *

We regret to record the death of Mr. WILLIAM ELLIS VINSON, who during a long life, held successively for upwards of half a century the positions of Secretary and Director of the Gloucester Gas Light Company. Mr. Vinson, who passed away at the age of 84, entered the service of the Company on leaving the Crypt Grammar School, under his father, the late Mr. George Vinson, in the year 1867. Subsequently he went to London to study at the Royal School of Mines. In 1879, upon the death of his father he was appointed Secretary to the Gloucester Company. He resigned the Secretaryship in 1920, when he was succeeded by Mr. T. B. James, and at the same time became a Director of the Company, surrendering the latter position in 1934, when a controlling interest in the Company was obtained by the Severn Valley Gas Corporation.

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Mr. JOHN PITTARD, a Director of the West Ham Chemical Works, Ltd., died at his home in Endsleigh Gardens, Ilford, on Oct. 26, at the age of 85. He had been associated with the Company for over half a century.

Letter to the Editor

Salaries of Gas Engineers

SIR,—I have been receiving a lot of letters recently regarding the above and I thought you really should know that this matter is receiving serious attention.

On Sept. 19 I wrote to the Secretary of the Institution, pointing out that at the Annual Meeting, in proposing the omnibus vote of thanks, I referred to the matter of salaries. I then told the members that the Council intended to take some action in this question.

Subsequently, two representatives from each District Association were invited to attend a meeting of the Council of the Institution, held on the 11th inst., when the Council unanimously agreed that this matter should be referred to each District Association in order that the districts could place before the Council some concrete proposals.

One or two districts have already had their meetings, and that for the Manchester District Association is called for Nov. 8.

I thought that the general body of your readers would like to have this information and it would save me having to answer their letters.

In conclusion, I might say that the question is not limited to the salaries of chief officials, but all classes of employees are being considered.

Yours, &c.,
C. S. SHAPLEY,
Engineer and General Manager.

City of Leeds Gas Department,
Market Hall,
Leeds, 2,
Oct. 28, 1938.

"GAS JOURNAL" Directory

In order that readers may be able to keep the particulars contained in the "JOURNAL" Directory up to date, we summarize in the following list various changes which have occurred during the past month:

Page 4. ANDOVER. G. T. Temblett, M.D., deceased.
" 42. LUDLOW. J. H. Paterson, E., M., & S., retired.
" 68. TREHARRIS. G. Beech appointed E. & S. vice B. Taylor, retired.
" 84. INVERBERVIE. A. S. Keay appointed M. vice J. MacDonald.

Institution of Gas Engineers

Members of The Institution of Gas Engineers will be welcome at a General Meeting of the Illuminating Engineering Society to be held in the Hall of the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W. 1, on Tuesday, Nov. 8, at 7 p.m. Light refreshments will be served at 6.30 p.m.

Papers will be presented (with demonstrations) on "The Revealing Power of Street Lighting Installations" by Mr. J. M. Waldram, "Necessary Values of Brightness Contrast in Artificially Lighted Streets" by Mr. C. Dunbar, and "Reflection Factor and Revealing Power" by Mr. F. C. Smith, and will be followed by discussions.

Admission cards for this meeting can be obtained from the Secretary of The Institution of Gas Engineers.

News of the Week

The Birkenhead Gas Committee recommend that a tender to erect the new gasholder at a cost of £70,139 be accepted.

A Petition by Tenants of the Bainsford Housing Scheme to have gas cookers installed has been remitted to the Falkirk Housing Committee.

For a New Gasholder at Gourock, Messrs. Henry Balfour & Co. (Leven, Fife) have secured the contract. The gasholder will be of the spirally-guided type.

An Increase of 5·43% in the output of gas during the month of September over the corresponding month of last year was reported at a meeting of the Plymouth Corporation Gas Committee on Oct. 26.

An Increase of 4½% in gas consumption at Darlington during the six months ended Sept. 30 as compared with the same period last year has been reported by the Corporation Gas and Electricity Committee. The delivery to consumers was 1,556 155 therms. The increase in electricity supplies was 3¼%.

An Extensive Exhibit has been arranged by the Edinburgh Gas Department at the Ideal Home, Food, and Fashion Exhibition, which opened in the Waverley Market, Edinburgh, on Oct. 29, and will continue for a fortnight. The Gas Department are also providing educational films and cookery demonstrations.

For a Bulk Supply to Kilbarchan, the Johnstone Gas Extension Committee has agreed to an arrangement with the Caledonian Gas Corporation, Ltd. The supply commenced on Nov. 1 and will continue until May 15, 1939, at the current Johnstone industrial rate of 1s. 6·06d. per 1,000 cu.ft., the question of further supply to be reconsidered in May.

It is Understood the Labour Party in Ellesmere Port Council will table a motion at the next monthly meeting calling for the rescinding of the minutes passed at the last special meeting to sell the Gas-Works to the United Kingdom Gas Corporation, Ltd., for the sum of £120 000. It is also understood that in the event of the motion not going through, there will be a demand for a plebiscite of the ratepayers.

Under the Employers' Scheme of weekly contributions to charities, Messrs. Alder & Mackay, Ltd., have just distributed the sum of £216 14s. 9d., made up as follows: To the Edinburgh Royal Infirmary, £137 11s. 9d.; to the Sick Children's Hospital, £41 4s.; and to the Queen's Institute of District Nursing, £37 19s. The contributions are deducted from the employees' weekly wages and distributed annually at this time.

To Mark the Close of the Empire Exhibition the staff of the Gas Pavilion held a most successful dance on Oct. 27 in the Locarno Ballroom, Sauchiehall Street, Glasgow. Among those present were Mr. David Fulton, Chairman of the Exhibition Gas Industry Working Committee; Mr. W. R. Oliver, Display Officer of the B.C.G.A.; Mr. W. R. Drummond, Secretary of the National Gas Organizations in Scotland; Mr. David Lawson, Organizer, Gas Exhibits; and Mr. R. D. Keillor.

At the Monthly Lunch of the Industrial Co-partnership Association at the Northumberland Rooms, W.C. 1, on Thursday, Nov. 3, Mr. Josiah Wedgwood, Junior, a Director of the well-known Staffordshire firm, will speak on "How a Business can Help to Preserve Democracy." He will describe the employment policy of the firm, with special reference to the recent departure of the firm from Stoke-on-Trent to a garden village factory. Mr. Lawrence Neal, Managing Director of Messrs. Daniel Neal & Sons, Ltd., will take the chair.

The Subject of "Gas for Heating" attracted a good attendance from the sales and fittings staffs of the Cambridge University and Town Gas Light Company, when an illustrated lecture was given by Mr. J. B. W. Wilkinson, of Bratt Colbran, Ltd., on Oct. 25. The lecturer explained in detail the advantages of overhead radiant heating where large-space installation was required, the construction of the various types of apparatus, their performance, with advice on fixing and maintenance. Following the lecture, Mr. Wilkinson introduced the latest "Portcullis" gas fire in a novel fashion, by asking a series of questions, which were answered by Mr. C. C. Penfold (Sales Manager of the firm), relating to the efficiency of this new product, and the several improvements which had been incorporated.

Among Stand-Holders at the fourth annual "Happy Homes" Exhibition held at the Marine Gardens Pavilion, Folkestone, from Oct. 22 to 29, were the Folkestone Gas Light and Coke Company.

For Public Lighting, the Dewsbury Corporation have decided to accept the tender of the Gas Department. The tender involves supply and lighting of an additional 214 lamps for the streets of the County Borough.

Seven Stands were Taken by the Dewsbury Gas Department at the Trades Exhibition at the Town Hall, Dewsbury, during the week ended Oct. 22. Demonstrations of cookery were given. Appliances demonstrated the use of gas for water heating, lighting, and central heating. A smoke abatement display emphasized the advantage of Dewsbury's graded gas coke and created much interest. Excellent business resulted from the exhibition.

Rapid Progress is being made with the £2,500,000 scheme of expansion at the Tollcross Ironworks and Clydebridge Steelworks of Colville's, Ltd., where a completely integrated production unit is being provided utilizing coke oven gas and the "hot-metal" process of steel manufacture. The new plant being constructed at Cambuslang, near Glasgow, has coke oven batteries which will supply the blast furnaces with fuel in the form of coke and the steel furnaces with adequate supplies of gas. The coke oven gas reserve will be stored in two gasholders with capacities of 3 million and 1 million cu.ft.

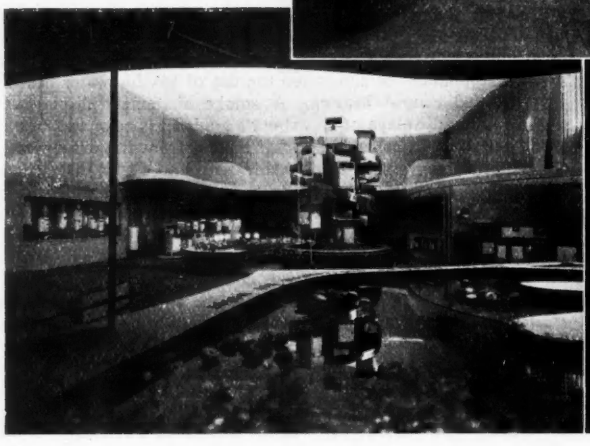
A Series of Cookery Demonstrations was held by the Welshpool Gas Company from Oct. 18 to 22 with the co-operation of Messrs. Falk, Stadelmann & Co., Ltd.; W. H. Dean & Son, Ltd., who demonstrated their washing machines; and Ascot Gas Water Heaters, Ltd. The attendances were highly gratifying, averaging 100 persons per day, and the resulting business was very satisfactory. The demonstrator was Miss M. E. D. Hume. A cake-baking competition attracted many entries, the first prize for the event being an "Ascot" sink water heater, fixed free. Other prizes included a hotplate.

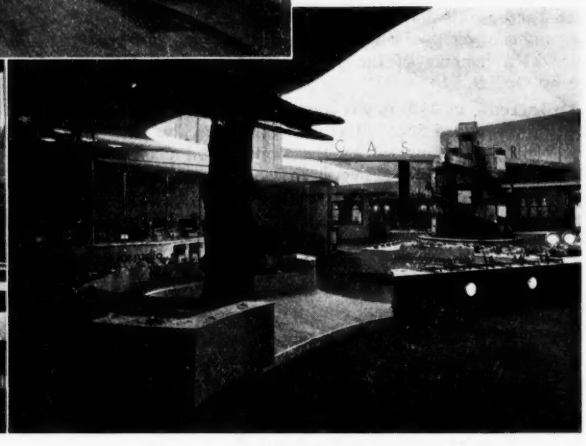
The Business Transacted at the Newcastle and Gateshead Gas Company's 17th annual "Sale" again surpassed all previous records. Considering that the opening of the "Sale" coincided with the Crisis, the results secured may be considered highly satisfactory. The usual publicity of press posters, cinema slides, and a special issue of 50,000 copies of "Gas Company's Sales News" was again carried out, together with three pony advertising vans, which toured round the domestic streets of the district. Queues began to gather early on the first morning of the "Sale." Bargains in gas appliances were eagerly snapped up and in one section alone 25 gas cookers were sold in the first 20 minutes.

Film Star Demonstrates Gas Washer

Miss Kathleen Kelly tries her hand at demonstrating a washing machine at the "Gas Fair" at the North London Exhibition.

THE Gas Fair AT THE NORTH LONDON EXHIBITION





REFERENCE has been made in a previous issue of the "JOURNAL" to the very fine "Gas Fair" arranged by the Tottenham and District Gas Company, in co-operation with leading manufacturers of gas appliances, at the North London Exhibition at the Alexandra Palace. The photographs reproduced here give some idea of the comprehensive nature of this gas section, which far transcends the efforts of other years.

To refer briefly to some of the more outstanding items of interest, it may be mentioned that Mr. Therm, in the form of a radiant Cox combustor, gave a literally warm welcome to all-comers, to the accompaniment of a repeating gramophone record —"Walk up, walk up—this way to the Gas Fair." Two Cox combustors were also fitted over the entrance doors.

Interesting Displays.

Among the individual displays were Home Laundry Demonstrations; a section sponsored by the Kitchen Planning Centre; a full exhibit of L.C.C.A. Smoke Abatement and Coke Grate publicity; and, of course, cookery demonstrations and film displays. The arrangement of the demonstration room and cinema theatre, seating respectively 70 and 140 persons, was ingenious, incorporating one wall in "staggered" sections which, while giving those inside an impression of privacy, at the same time enabled those outside to obtain a clear view of the platform or screen. Fifty-minute cinema performances were given each hour from 2.30 p.m. onwards, preceded by Mr. Therm's first personal appearance—a marionette show lasting five minutes. In the demonstration room four one-hour demonstrations were given, alternate hours being taken by one of two co-operating firms, with a complete change each week. Each demonstration was preceded by a mannequin parade of "Coveralls" and "Overalls" by Messrs. Lujon, of Edmonton—comprising wear for the kitchen.

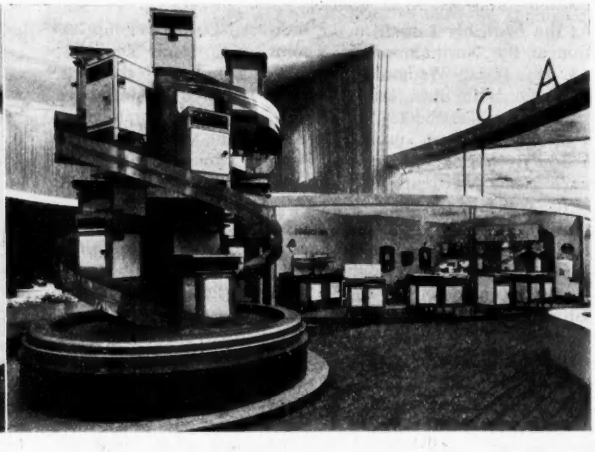
A Garden Lay-out.

The centre space of the Exhibition took the form of a symbolic garden lay-out with seats where visitors could rest. Grouped around were small portable gas appliances, while gas lamps were effectively "planted" in the flower bed. This garden led up to the revolving spiral of gas cookers seen in the photographs.

Particularly attractive was the hot water pool, containing artificial water lilies and fed by three fountains of hot water supplied by multi-point water heaters. Four streamlined columns rose from the pool's edge to support a curved facia bearing the words "Gas Fair." A striking display by Ascot's incorporated a raised tea terrace. Other co-operating exhibitors included Barker &

Parkinson

— and —



Radiation.

Turner, Cannon, Dean, Eagle Range, Flavel, Kempton, Main, National, Parkinson, Radiation, SoFono, and Stoves.

The staff of the Tottenham and District Gas Company's Home Service Department acted as hostesses and were dressed similarly in navy blue and white costumes with small badges bearing the words "Home Service Hostess."

News from the Fair.

We give below some of the outstanding events of the Gas Fair, including visits from well-known figures:

Saturday, Oct. 15.—A record day's business was transacted, being more than double the first Saturday of the previous year.

Tuesday, Oct. 18.—The first North London Salesmen's Circle meeting was held in the Middlesex Rooms at the Alexandra Palace, and the occasion was made Ladies' Night. Members of the London District and Home Counties—Southern District—Circles, and of the London and Home Counties Demonstrators' Circle, were guests of the North London Salesmen's Circle on this occasion.

Wednesday, Oct. 19.—Miss Kathleen Kelly, star of "Mutiny on the Elsinore," visited the Gas Fair on her way to Hoddesdon to judge the Beauty Contest in connexion with the local Shopping Week, during which period the Tottenham Company made a special offer of North London Exhibition tickets to all purchasers of gas appliances. Later in the evening the President, Council, and members of the London and Southern District Junior Gas Association visited the Gas Fair.

Thursday, Oct. 20.—This was Women's Gas Council Day, and in addition to members from all Tottenham branches, members from Downham, Livesey, Bexleyheath, Wandsworth, Woolwich, Brixton, and Hornsey were guests of the Gas Fair, and joined the local members at tea which was served in two sessions of about 360 each.

On the same afternoon the elected Beauty Queen of Hoddesdon, Miss Irene Hardwick, toured the Fair and was the chief guest at the first Women's Gas Council Tea.

Friday, Oct. 21.—The distinguished guests of the afternoon were Mr. and Mrs. Owen Nares, who toured the Fair and expressed great interest in all they saw. In addition, they witnessed Mr. Therm's Personal Appearance and the new film "Happy in the Morning." The visit concluded with tea on the Ascot stand.

Cannon's Display.

Monday, Oct. 24.—Miss Julie Sudeo, the film star, visited the Exhibition as the guest of Messrs. Daniels, of Kentish Town, who are sponsoring the Fashion Parade. She was received in the Gas Fair and was particularly interested in the gas radio.

Women's Gas Council

General Consultative Committee.

The General Consultative Committee of the Women's Gas Council met on Oct. 24. At the opening of the meeting Miss Wolseley-Lewis, Chairman, welcomed new members from Leicester, Ormskirk, Leyland, Prescot, Hornsey, Lea Bridge, and Runcorn. After a business session, at which there was a general discussion of programmes and other problems of branch organization, the meeting was addressed by the Dowager Marchioness of Reading, Chairman of the Women's Voluntary Services.

Lady Reading said the Women's Voluntary Services came into being in June at the request of the Home Secretary, who wished to stimulate women's interest in the work of Air Raid Precautions. The Women's Voluntary Services worked through existing women's societies, and there were representatives of sixty-five national bodies on the Advisory Council. Great Britain was divided into thirteen regions for A.R.P. work and the W.V.S. had an organizer and staff in each region. These organizations were responsible for starting centres in each county and for stimulating the local authorities to provide training facilities and in other ways to perfect their organization. Lady Reading felt sure that only by these means could one safeguard future leisure, for a time would come when leisure would not be here in the shape it is to-day, unless we were prepared to make sacrifices. She said half a million trained A.R.P. workers were needed by Christmas and women had to consider how this could be done and how the organization could be built up in England by voluntary methods, so that abroad they would watch, look, and listen.

During the crisis everyone rushed forward asking "What can I do?", and it was pathetic to see eager willing people not knowing what to do or how to do it. Every woman should go to classes for first aid, anti-gas and home nursing, especially those in rural areas, and so become one of the "informed" public. They would then feel prepared to deal with any situation that might arise and they should bear in mind that canteen, clerical, telephone, messenger, and ambulance work would also be needed. Every woman should be prepared to take the responsibility of leadership. Leadership was required in peace time, but it was required more in moments of emergency. A war would no longer mean saying good-bye to their men at the station, it would be rescuing their neighbour's child in an air raid, or setting the leg of the man in the street. Local authorities had a difficult time with the additional burden of A.R.P. organization, but the job of the women was to help the local authorities to find their volunteers and to get them trained.

A vote of thanks to Lady Reading was proposed by Mrs. Clowes and seconded by Councillor Mrs. Evans.

Glasgow and Coke Oven Gas

The Glasgow Corporation Sub-Committee on Distribution and Works have decided to reject the offer of Messrs. William Dixon, Ltd., Govan Iron Works, Glasgow, to supply 6 million cu.ft. of coke oven gas daily to the Corporation at 5½d. per 1,000 cu.ft.

Over a year ago the firm made its offer, and in January of this year it improved the original terms by modifying the sliding scale arrangement for fluctuation in the cost of coal. A conference was held between the parties concerned, when the Steel Trade Confederation pointed out that trade union conditions were not being observed in the employment of certain maintenance engineers at the works. Intimation that this complaint had been removed was made by Messrs. Dixon in February, but the Committee suspended consideration of the offer on the ground that Standing Orders required three months' conformity with trade union regulations before a contract could be negotiated. Holidays and other causes were responsible for the subsequent delay.

The majority on the Council take the view that the utilization of surplus gas from outside sources would adversely affect employment in the municipal gas-works.

New Showrooms Opened at Porthcawl

Fulfilling a long-felt want, showrooms for the Porthcawl Gas Department were opened by the Chairman of the Gas Committee, Councillor Edward Thomas, on Oct. 24. The ceremony was to have been performed by the Chairman of the Urban District Council; he was, however, unable to attend owing to indisposition.

The premises are situated in the main road leading through the town to the seafront. The windows are of the "open" type, enabling the passer-by to have an interrupted view of the interior, which is well lighted at night by modern gas fittings. A bright colour scheme has been employed throughout, cream, apple green, and light oak predominating. As one enters the premises, there is a cooker display embracing many of the latest models, while on the left there is a demonstration coke fire. It is hoped shortly to have a fitted bathroom towards the back of the showroom for the demonstration of various types of water heater. Upstairs there is a useful room that can be used for small demonstrations or meetings. Usually the Department's demonstrations are so well attended that they have to be held in the large Pavilion on the seafront.

Declaring the premises open, the Chairman of the Gas Committee said that in opening the showrooms the Council were out to improve the gas service in the town. The new premises provided an amenity that was long overdue.

Overhead Gas Heaters for Village Hall

The South Bank and Normanby Gas Company recently secured the order for the heating of a new Village Hall at Ormesby, near Middlesbrough.

The building is of modern design, with brick outside and "Celotex" boarding inside, with an air space between. It is 54 ft. long by 38 ft. wide and 11 ft. high to the eaves.

The Hall is to be used for social meetings, dances, &c., and the Committee was desirous that there should be no radiators of any sort on the floor. The heating has therefore been carried out as follows:

Main Hall.—10 wall pattern Bratt Colbran overhead heaters.

Stage (which also acts as a Committee Room and supper room when necessary).—1 wall pattern Bratt Colbran overhead heater and 2 points for Bratt Colbran "Mortimer" heaters.

Ante-rooms.—1 Bratt Colbran "Mortimer" heater in each room.

Kitchen.—1 No. 3 "Siamese Duplex" tea boiler with space for cooker if desired later.

It is yet too soon to say what the exact running cost of the installation will be, but from experience to date the Committee are very well pleased, not only with the running and initial cost but also with the general neatness and efficiency of the job.

The accompanying photograph is a view looking from the stage, showing the heaters on the walls.

Forthcoming Engagements

November.

3.—Midland Juniors.—Paper by A. V. Wainwright on "The Remote Control of a District Gasholder."

3.—S.B.G.I.—Autumn General Meeting, May Fair Hotel, W. 1. Council Meeting at 56, Victoria Street, S.W. 1, 11 a.m.

4.—B.C.G.A.—Executive Committee, 11.30 a.m.

5.—Scottish Eastern Juniors.—Tour of Works in Edinburgh Using Town Gas for Industrial Purposes.

8.—London and Southern Juniors.—Discussion on "Technical Education in the Gas Industry," introduced by Dr. J. N. Long.

10.—G.C.P.A.—Committee Meeting, 5, Victoria Street, S.W. 1, 2.30 p.m.

12.—Scottish Western Juniors.—Address by W. R. Drummond on "The Work of the National Gas Organizations in Scotland."

15.—B.C.G.A.—Yorkshire District Meeting, Leeds.

15.—B.C.G.A.—South-Western District Meeting, Exeter.

16.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Paper on "Framing a Sales Policy from Market Research."

16.—Manchester and District Juniors.—Visit to Victory Works of Parkinson & Cowan (Gas Meters), Ltd., Stretford. Paper by F. Bell on "Installation of Gas and Steam Equipment in a Municipal Kitchen."

17.—Midland Juniors.—Visit to John Harper & Co., Ltd., Willenhall.

18.—I.G.E.—Session at Public Health Exhibition, Agricultural Hall, Islington, 3 p.m.

18.—North of England (Auxiliary) Association.—Half-yearly Meeting at Newcastle-upon-Tyne, 2.30 p.m. Paper by J. S. Merry on "Boiler Water Problems."

18.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

19.—Western Juniors.—Visit to Portishead Generating Station, Bristol. Paper by H. C. Widlake, of Plymouth.

25.—Southern Association.—General Meeting, Hotel Victoria, Northumberland Avenue, W.C. 2, 2.15 p.m. Paper by S. F. Dunkley on "Quality Control and a System in Operation." Committee Meeting, 11.45 a.m.

25.—London and Southern Juniors.—Annual Dinner and Concert, Empire Restaurant, Victoria, S.W. 1.

26.—Scottish Western Juniors.—Visit to Greenock Corporation Gas Department.

(There will be no meeting of the Central Executive Board of the National Gas Council or of the Central Committee of the Federation of Gas Employers during the Month of November.)

December.

1.—Midland Juniors.—Paper by F. A. C. Pykett, "The Distribution of Gas at Coventry."

3.—Manchester and District Juniors.—Meeting at Blackburn. Paper by E. B. Field on "Advantages and Disadvantages in the Production and Distribution of a Low-Quality Gas."

Birmingham's New Two-Part Tariff

The Birmingham Gas Department have announced that all consumers may arrange to pay for their gas on the terms of a two-part tariff recently introduced—provided they use gas for water heating.

The tariff consists of a quarterly fixed charge of 2s. 6d. in respect of each habitable room; a commodity charge of 5d. per therm for the gas consumed for all purposes; a quarterly payment by slot consumers who have a gas cooker on loan. It is pointed out that the rate now paid by the majority of consumers is 8d. per therm during the summer quarter and 7·58d. per therm during the remainder of the year. The new tariff will therefore enable consumers to effect a saving of approximately one-third in the price paid for all gas used beyond a certain quantity.

Acceptance of the two-part tariff will give consumers for the first time the advantages of constant hot water at a cost that will be attractive to all gas users. Those who already possess a gas water heater will be able to extend, at a most economical figure, the use of gas to many other domestic purposes.

Cookery Demonstrations at Stroud

A series of cookery demonstrations were held recently in the Lecture Room of the Stroud Gas Light and Coke Company, in collaboration with the Parkinson Stove Company, Ltd.

The demonstrations were given on the Parkinson "Renown" gas cooker by Mrs. D. Scott (*Diplomée* N.T.S.C.). Very good attendances were recorded throughout the week, and much interest was shown in the demonstration of how to cook a complete meal at the cost of 1d. for gas consumed.

In this connexion a competition was held, in which members of the audience were asked to estimate how much gas was used per hour in the demonstration, or the amount used to cook a complete dinner.

An exhibition of Parkinson modern gas cookers, fires, and radiators was staged by the Gas Company, in order to show how complete and efficient was the service they had to offer to consumers for the comfort and health of the household.

Beauty from Within

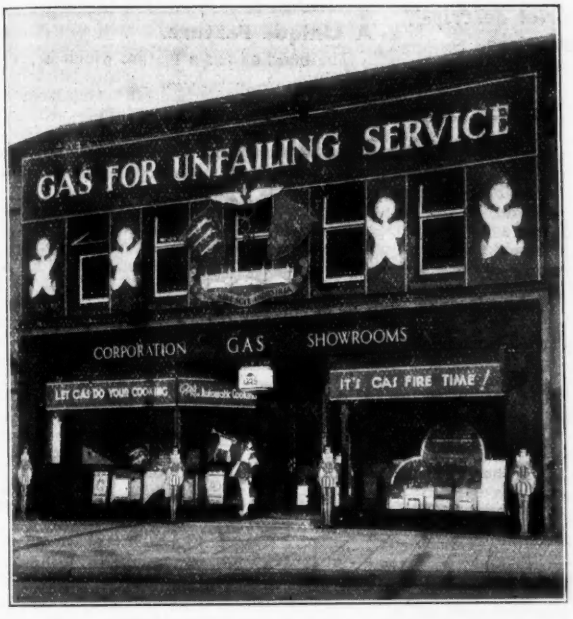
Gas consumers of Halifax were recently invited by the Halifax Corporation Gas Department, in conjunction with Radiation Ltd., to Cooking and Beauty Demonstrations in the gas showrooms.

Miss J. E. Ford, of the Radiation Research Kitchen, cooked balanced food and demonstrated how such diets help towards general well-being and physical fitness, which leads to beauty.

The attendances exceeded any previous records for cookery demonstrations held in Halifax during the past two years, which suggests that the modern trend to keep fit has created interest among housewives and given them a new line to introduce into their everyday cooking, with beneficial results obtained from balanced eating.

B.C.G.A. District Conferences

During the past few days the British Commercial Gas Association have held district conferences successively in Manchester for the Manchester District, London for the Eastern District, Newcastle-upon-Tyne for the Northern District, Rotherham for the Yorkshire District, Shrewsbury for the Midland District, and Cardiff for the South Wales District. In most cases the programme was the same at each *venue*, for, as already announced in these columns, owing to the cancellation of the Annual Conference which was to have been held at Brighton and because some members were unable to be present at the 27th Annual General Meeting, which was held in London on Oct. 18, arrangements were made for district meetings at which the new season's films were shown, followed, after luncheon, by private discussion on the Association's Smoke Abatement Campaign and those aspects of the Association's work which are of particular interest at the present time.



This is how Rotherham showrooms were decorated to welcome delegates to the Yorkshire District B.C.G.A. Conference. Cookery demonstrations were held during the whole week in conjunction with the visit.

At Rotherham the showrooms were decorated in honour of the occasion. At this meeting an address was given by Dr. Johnstone Jervis, D.P.H. (Medical Officer of Health, Leeds), on "Smoke Abatement." After luncheon by kind invitation of the Chairman and Members of the County Borough of Rotherham Gas Committee, the delegates visited Messrs. J. J. Habershons & Sons. The President of the Conference was Alderman R. Kirk, Chairman of the Rotherham Gas Committee.

The British Coal Utilization Research Association

It is announced that the Association has decided to establish an Experimental Station in London. Premises have been secured at West Brompton and are now in course of being converted and equipped. The Council announces certain appointments to the scientific staff.

One of these is Dr. D. H. Bangham, lately Professor of Chemistry at Cairo University, and Dean of the Faculty of Science. Dr. Bangham, who has made important contributions to the physical chemistry of charcoal, cellulose, and other carbonaceous materials, now becomes the senior member of the scientific staff, and will take charge of an important group of programmes connected with the use of coal.

Mr. J. S. Hales will take charge of the Domestic Appliances Department. Mr. Hales, who is well-known for his work at the Fuel Research Station on the measurement of smoke and the operation of coke fires, has since had important industrial experience on the research staff of a leading manufacturer of domestic solid fuel burning appliances.

Mr. R. T. Hancock, formerly Associate Editor and contributor to Kemp's Engineers' Handbook, has been appointed head of the Intelligence Department and Editor of the Association's Monthly Bulletin. Further appointments have been made to the assistant and junior scientific staff.

Athletic and Social

Ashton and Mossley and Saddleworth Dinner and Dance.

A very successful staff dinner and dance was given by the Ashton and the Mossley and Saddleworth Gas Companies at the "Highland Laddie" Hotel on Oct. 26. Nearly eighty persons were present.

At the conclusion of dinner, Mr. Corby, General Manager of General Gas Appliances, proposed the toast of the Companies, wishing them prosperity in the future and congratulating them upon the inception and organization of their first dinner and dance.

Mr. William Bennett, General Manager of the two Companies, responded, and Mr. Douglas Gill, Sales Manager of the Ashton Gas Company, proposed the toast of the guests.

The response was by Mr. Kirkup, of Messrs. Lambert Brothers.

After dinner there was dancing to the Crakajax Band, interspersed with entertaining by Miss Doris Hilton, "the Girl with the 'Mike,'" and Mr. Norman Duxbury, an accomplished amateur conjurer.

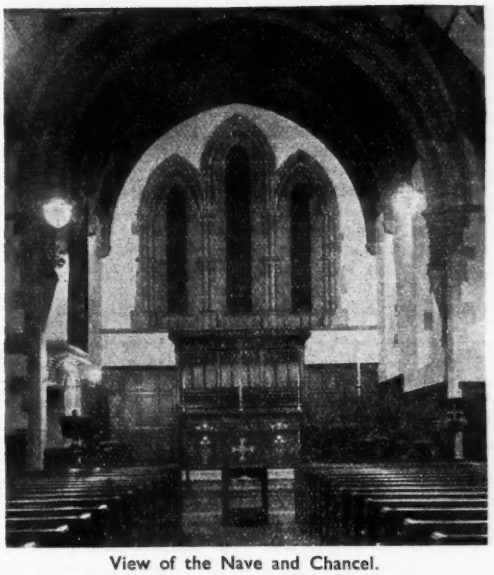
Cleethorpes Cricket Club.

Cleethorpes Gas Company Cricket Club were winners this season of the Championship of the mid-week section of the Grimsby and District Cricket League. The members of the Club celebrated their success recently with a dinner at the Café Royal, Cleethorpes.

Gas Lighting for Sunderland Church

An improved system of gas lighting has recently been carried out by the Sunderland Gas Company at St. Mary's Parish Church, South Hylton.

The whole of the fittings in the Chancel are of the directive type and are concealed behind the stone projections. Great care was taken to illuminate the beautiful reredos and altar, which are of dark oak, and the light was focused on to the cross in the centre of the altar. In the nave, three existing lamps were augmented by two of the new "St. Martins" type, and four of these were fixed in pairs at a height of 15 ft., and a single one fixed at the West End of the Church—the whole of the lamps being independently operated by "Webson" switches.



View of the Nave and Chancel.

There are also five black iron brackets with suitable scrolls and "Exeter" burners, with slightly frosted glass globes to complete this all-gas lighting installation, which is much admired and is receiving attention from other churches in the Company's area of supply.

Radiant House—

New Chief Offices for Watford Company

Less than 20 months after the first sketches had been submitted to the Directors, Radiant House, the new Chief Offices of the Watford and St. Albans Gas Company, were opened for business. We give in the accompanying article a brief description of the premises.

THE Watford and St. Albans Gas Company's new Chief Offices in Clarendon Road, Watford, which have become necessary owing to the Company's rapid growth and ever-increasing staff, make a worthy headquarters for so large and important a concern.

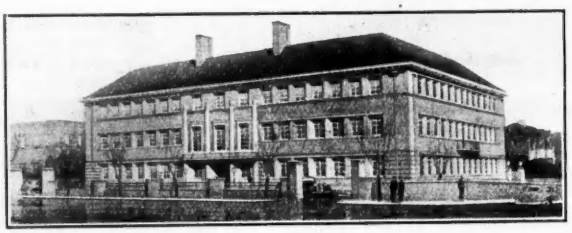
The building, which is of Hertfordshire bricks with a steel frame and a roof of Roman tiles, stands in a dominating position and has all the qualities of beauty, dignity, and spaciousness. Built well back from the roadway with a service road to the main entrance, and lawns in the front and at the sides, every danger of a cramped appearance has been avoided. The service road itself is fronted by a low wall and a curtain of slender silver birches. At night, the building is floodlit by ten clock-controlled parabolic floodlights which are concealed in buttresses in the wall.

Imposing Entrance Hall.

Between black marble flanking bases, on which stand bronze "beacon" lamps, a few wide steps lead to the large front doors of walnut which open into the imposing entrance hall. On the right is the enquiry bureau and to the left the waiting recess. Both these rooms are panelled throughout in African cherry. The hall, like all the other rooms in the building, has rubber floors, while the finishes are kept simple with painted walls and distempered ceilings. The light colours which have been chosen give the offices a sense of airiness and brightness that make extremely pleasant working conditions for the staff.

Opposite the entrance doors is the main staircase, while to the right is the passenger lift which serves all the three floors. At the rear of the hall is a staff staircase and a service lift which serves all floors and the basement.

Wide corridors run the entire length of the building and give easy access to all the offices, which are furnished throughout in a practical, modern manner. On the ground floor there are the District Manager's office, his general office, the Residuals Department, the Publicity Department and Studio, the Auditor's Department, the private telephone exchange room, the Rentals Superintendent's office, the Rentals Department, the Addressograph Department, and the Rentals Department machine room. Also on this floor is the slot collectors' room, which has a separate entrance at the rear. An interesting point about the Addressograph, Machine, and Telephone rooms is that they are all soundproofed.



On the first floor opposite the main staircase is the Board Room, panelled in brown oak burr with a parquet floor and furniture to match. There are large casement windows down the whole of one side, opening on to a balcony.

Adjacent to the Board Room is the General Manager's private office, while nearby are the offices of the Chief Engineer, the Production Engineer, the Accountant and the Assistant Secretary. Other offices on this floor are the Assistant Accountant's, with the Accountant's General office, the Secretarial Department, the Chief Engineer's Drawing office, and the typists' room, which is soundproofed.

Canteen.

On the third floor is the canteen. This is a really delightful room, with windows on three sides, giving one the impression of being on a boat. From the windows there are extensive views over a large area. The staff have a quarter of an hour's break in the morning and afternoon, while an excellent luncheon at a moderate price is served daily. The kitchen, where all the meals are prepared, are fully equipped with modern gas ranges and hot closets in porcelain enamel and chromium, a gas refrigerator, and other appliances. Opposite the kitchen is a private dining-room for the use of the Directors and officials. Nearby is the games room, where the staff may play table tennis and other indoor games. A few rooms on the top floor have been left for office development in the future.

The air conditioning plant is housed in the basement and consists of an electrically-driven fan which induces air from outside the building through filters, then through a heating battery fed from the central heating plant. This air is conveyed by means of galvanized iron ducts to every room in the building, entering by way of neat grilles let into the wall at suitable positions above the picture rail. The temperature of the air is governed by a thermostatic control.

A Unique Feature.

The building has a feature which is probably unique, considering its size, inasmuch as every interior gas lighting unit is mechanically ventilated by means of an extract plant in the roof space. This primarily consists of an extract fan driven by a motor, and from the inlet of the fan asbestos cement trunking is arranged throughout the building with connexions to each lighting unit so as to extract all stale air from the rooms.

Owing to the fact that the ventilation of the lamps would be impaired if an attempt was made to use them without the extract fan being in operation, a direct current electric motor is provided which, like the alternating current motor, is permanently coupled to the fan shaft by means of vee-belts.

In the event of a breakdown of the Watford alternating current supply, the direct current motor takes up the drive, being fed from a battery which is trickle charged during the whole time the alternating current motor is operating. However, in order to bring the battery up to normal voltage quickly after using the D.C. motor this battery is subjected to rapid charging on the restoration of the A.C. current supply.

In the roof space there is also installed a separate ventilating plant for the kitchen and the various lavatories in the building.

The heating of Radiant House is carried out by means of a dual accelerated low-pressure hot water system and fresh air ventilation plant. An "Ideal" gas-fired thermostatically controlled boiler of 1,300,000 B.Th.U./hr. capacity feeds the radiators in the various rooms and also the fresh air ventilation heater battery. The temperature of the boiler is varied with the fluctuations of the external temperature and the times of the operation of the plant governed by means of a clock control. Hot water is supplied to all taps in the building from a smaller "Ideal" with a storage of 100 gallons.

At the rear of the building is a large courtyard with a covered shelter for cars and accommodation for cycles with a caretaker's cottage at the end of the yard.

A Story of Constant Growth.

It was back in 1930 that the old-established gas companies of Watford and St. Albans amalgamated, consolidating their resources and eliminating in a large measure duplicate costs and overhead charges. Within the following four years the gas undertakings of Elstree, Hemel Hempstead, Welwyn and Hatfield, Harpenden, and Rickmansworth were taken over, giving the Company an area of supply of 223 square miles.

In a message in the attractive brochure published to mark the opening of the new Chief Offices, the Chairman and Managing Director, Mr. Frank H. Jones, M.Inst.C.E., writes:

"One hundred and four years ago this Company was formed. From a modest start it has grown into an undertaking with over 1,000 employees, supplying a population of nearly a quarter of a million with gas. The last decade especially has been one of constant growth and development. In view of this it is not surprising that in many of our districts in Hertfordshire we have outgrown our accommodation and more commodious premises have become necessary to house our ever-increasing staff. And so we come to Radiant House. Embodying as it does all that is new and best in modern office design, it will enable our administrative staff to work in surroundings that are bright and spacious, to the attainment of that object we have always in mind—the furthering of our good name for conscientious service and efficiency."

Education - - - - -

by

R. ROBERTSON, M.Inst.C.E.

(President of The Institution of Gas Engineers).

An Address to the Western Junior Gas Association, Oct. 15.

Education in Theory.

Generally speaking, education means the training and development of the faculties of mind and body and the acquiring of knowledge and accomplishments on the part of the young in accordance with the views of their elders.

In its narrower and more academic sense, it concerns the teacher and the taught, is the special business of the schoolroom or study, and occupies about 20% of the waking time during ten to fifteen years of the average life, in the course of which the student is occupied chiefly in learning the use of letters and numbers, absorbing a certain amount of general knowledge, and, in the process, developing the powers of observation and thought.

Next we have the education which is concerned with vocational training, in the course of which the student, as apprentice, pupil, or trainee, acquires the special knowledge, manipulative skill, and experience which qualify him to take his place and make his contribution as a responsible member of the community. With those who recognize no such obligations we are not here concerned.

Then there is the wider and more general sense in which education may be said to embrace all that concerns the individual and his environment, and all experience, whether conscious or subconscious, over a period coterminous with life itself. Indeed, the formative influences extend beyond the individual life and justify the eugenist's plea that a man's education should begin with his grandparents or before.

The subject is a very controversial one, and the reports of the proceedings at those annual conferences where educational experts foregather invariably provide good copy for the popular Press, in the shape of candid criticisms of the existing order and the airing of rival views as to what should be done about it.

One of the major issues, mainly political, is whether and to what extent the interests of the individual or of the community should come first in determining the educational ideals to be aimed at. The Spartan regime furnishes an early example of the communal interest having precedence and the modern totalitarian state stands for the same educational ideal which is the training of youth to serve and, if need be, to die for the state on state-approved lines. Opposed to this, we have the democratic ideal which, in theory at least, recognizes the right of the individual to live his own life and choose his own destiny—within certain conventional limits, of course.

The Ornamental and the Useful.

Under ideal conditions, the interests of the state and of the individual should be identical, but so long as difference of opinion exists as to what constitutes the ideal state, so long will there be difference of opinion regarding the education of the individual *qua* subject and, bearing in mind the present day tendency towards more and more political interference in both domestic and industrial affairs, with a corresponding growth in bureaucratic power, the matter is not without its practical interest to those concerned with educational ideals.

Other opposing schools of thought may be described as the ornamental and the useful. To the former education is a means of acquiring fashionable accomplishments and a nodding acquaintance, at least, with some conventional form of culture which may have very little to do with the practical side of life. In ancient Greece, when the tide of civilization had reached its highest level, the Delphic motto was "Know Thyself," but the chief subjects taught in the schools were the fine arts, rhetoric, physical culture, and a philosophy which had little bearing upon action. The intellectual snobbery of the day, while it exalted the theoretical, despised the practical, and knowledge as an aid to the arts of life had a subordinate place.

This preference for the ornamental rather than the useful survived the 2,000 years which separated the Golden Age of Greece from the industrial era, and as recently as a 100 years ago a prominent Oxford Professor, on the occasion of the conferment of the D.C.L. on four distinguished scientists, wrote to a friend "The Oxford Doctors have truckled sadly to the spirit of the times in receiving this hodge-podge of philosophers." Even after a century of industrialism the ornamental is still preferred in certain social and academic circles, but, in general, the swing of the pendulum is now in the opposite direction, and in one country at least—viz., Russia, where circumstances favour the experiment—an educational system has been evolved under which only those subjects are taught which have some practical application.

The Happy Mean.

Somewhere between, we have the happy mean, the aim of which is to provide the best possible educational equipment in the form of a highly developed capacity for clear and creative thought and executive skill and, at the same time, to ensure sufficient leisure and opportunity for the pursuit of more æsthetic culture, so that the result may be a well-balanced, all round development—a sane mind in a sane body.

Here it may be noted that present-day youth enjoys far greater opportunities for acquiring general culture than his predecessors. This has been made possible by an all-round reduction in the hours of labour, better and cheaper educational facilities, improved means of transport and communication, a prolific Press, and a B.B.C. which, for 10s. per annum, brings the humblest enquirer into personal contact with acknowledged experts on every conceivable subject, from the foundations of music and the laying-out of a rock garden to the latest phase in world politics. Only those brought up under less spacious conditions can appreciate the difference and, after the manner of the elderly, they sometimes wonder whether these opportunities are taken advantage of as they might be.

There is also a difference of opinion as to the age at which the state-imposed education of the subject should begin and, still more, the age at which it should finish. The latter has been gradually increased, partly as a corollary to the limitation of child labour on humanitarian grounds and partly as a concession to the desire for a higher minimum educational standard on social and political grounds, the extreme view now being that child labour should be abolished and equal educational opportunities given to all.

Opposed to this is the view that the existing social and economic order is still far from providing the conditions into which a nation of public school boys or university graduates would fit, and there is the further difficulty arising out of the diversity of capacity for education in those to be educated. Any attempt, therefore, to apply one common educational standard to everybody, whatever his mental capacity and whatever his ultimate occupation, would be as unlikely to succeed as the application of a standard ready-made suit of clothing to all shapes and sizes and for all occasions from a wedding or a funeral to a golf course or a lido.

Apart, however, from the economic and sociological aspect of the indiscriminate raising of the school leaving age, it is interesting to note that, according to evidence given by leading industrialists recently in connexion with this question, boys of 14 acquire more quickly the manipulative skill required for certain occupations than those who begin later. More recently, the Chief Training Officer of the Gas Light and Coke Company has stated that the elementary school boy makes the best craftsman.

Vocational Training.

Here we touch upon the problem of vocational training, about which there are also differences of opinion. The Guilds of the Middle Ages made it their business to provide a well-regulated supply of highly skilled craftsmen for their respective crafts; later, the small workshop, which was a

feature of the earlier days of the industrial revolution, continued to train apprentices, but with the elimination of the small employer and the introduction of mass production method everywhere the supply of skilled craftsmen has become an acute problem in engineering and allied industries.

Under the present educational regimen, vocational training is definitely excluded from the functions of the state aided educational institution. It is true that various forms of handicraft are taught in both day and night schools, while laboratories and workshops are commonly provided for so-called practical training, but the underlying principle is not the teaching of craftsmanship as such, but the demonstration of principles involved in the various crafts or trades. So far as this country is concerned, actual training in particular trades remains the business of the employer; a number of the larger industrial undertakings have established trade schools and the educational authorities are invariably sympathetic and ready to help. On the Continent, however, the trade school has become a common feature of educational activity, attendance being compulsory from 13-14 years of age on the part of those desiring to enter particular trades.

Reverting again to those whose circumstances admit of education beyond the limits set by the minimum school leaving age, other problems present themselves, each with its alternative solution and each alternative with its advocates; the age and stage at which specialization should begin; whether the educational course should aim at turning out the fully-fledged practitioner, as in the medical profession, or whether it should aim at providing the theoretical and the fundamental only, leaving the practical experience to be acquired in the appropriate environment later on, or whether it is better to run a theoretical course concurrently with practical training as in the "sandwich" system favoured by some universities and practised by the great majority who either from choice or force of circumstances commence their practical training on leaving school and acquire their technical training by attending evening classes.

There is the further problem of whether the special course designed to prepare the student for a particular calling should be limited to the technology of that calling or should include such further subjects as business management as a preparation for higher administrative positions—such are too often left to be acquired fortuitously or after the position has been attained.

Methods of Education.

Then we have opposing views regarding the methods or mechanism of education. At one extreme we have the apostles of mass production, the standardization of study in the form of syllabuses, the regimentation of students according to age and sex, the measurement of results by examinations, and the application of stimuli in the form of rewards and punishments; even games are chosen which favour the cultivation of mass or team spirit rather than individual effort. At the opposite extreme we have the apostles of freedom and self expression, the preservation and even accentuation of individuality, the taboo of repression and inhibition, in short, the cult of Topsy who just "growed."

In this connexion, also, opinion differs widely regarding the written examination as a means of measuring results and the application of these to the solution of that most difficult of after-school problems—the placing of the ex-scholar in the occupation for which he is best suited. It is safe to assume that even the most ruthless regimentation of students and standardization of study fail to alter appreciably those natural aptitudes and talents, the presence or absence of which determines to a great extent the ex-scholar's suitability, or otherwise, for a particular kind of work, but the conventional examination takes little cognizance of this.

Occasionally, a personal inclination towards, and a genius for, a particular kind of work manifests itself at an early age and the choice of a career becomes an easy matter. In the majority of cases, however, no special inclination or talents are disclosed, and much unhappiness and waste of time and energy are caused through misdirection in the choice of a career, based not infrequently upon the results of the school examinations.

Other defects attributed to the conventional examination are that it attaches too much importance to the capacity for memorizing data and manipulating these in certain conventional ways, it gives little indication of the student's ability to make use of the knowledge acquired in any practical direction, and it takes no cognizance of the mental and psychological reactions which the atmosphere of the examination room is liable to produce in certain types of students, rendering them incapable of doing justice to themselves. Even the examination results in a special technological course, crowned it may be with an honours degree, is no guarantee of the student's probable usefulness in a given sphere.

But, while it is easy to point out the defects in the system, it is less easy to provide a remedy, and while many of our leading educationalists have gone so far as to adopt the slogan "Examinations must go," they have no very satisfactory alternative to offer, such as would not only give a fair indication of the candidate's general knowledge and intelligence, but some indication of his character and personality and, what is equally important, his aptitude for a particular job.

The oral examination is, in some respects, an improvement on the written examination and is useful if arranged to follow as a check upon the extent to which the knowledge displayed in the written examination represents a feat of memory, a shrewd guess, or a sound fundamental grasp of essentials, and in giving some indication of the candidate's more personal qualities. The weakness of the oral examination is that it requires a much greater degree of skill and discrimination on the part of the examiner and, in the absence of these, the results may prove as unreliable as those obtained by the older method.

The so-called intelligence test, which is now recognized by the Educational Authorities, is also, in some respects, an improvement upon the conventional school examination, and the Institute of Industrial Psychology has done much useful work in devising tests for the evaluation of special qualities and aptitudes, but for discriminating between precocity and genius or between stupidity and late development and for evaluating latent capacities for initiative, adequacy in emergency, staying qualities, or organizing ability, the would-be employer has, for the most part, to fall back upon his own common sense judgment and hope for the best.

Education in Practice.

Having noted the differences of opinion regarding the various aspects of the educational problem, it only remains to be said that, in practice, no serious difficulties are encountered, for the genius of the British people for compromise has produced an educational system which reflects all shades of opinion and, while pleasing nobody all the time, it is never allowed to remain static sufficiently long to provide a really serious issue. Further, with all their boasted love of individual freedom, the British people have a profound respect for custom and tradition, and any undue tendency on the part of individual or group to express or practise ideas which are for the time being not in keeping with the established code is discouraged in no uncertain way. For these reasons, serious issues between the state and the subject on educational matters seldom arise, and, if they do, the spirit of compromise automatically comes into operation and sooner or later the balance of things is restored.

Similarly with the useful and the ornamental, our elementary school curriculum is a blend of the two. Side by side with the three primary "R's" we have subjects which are of little practical value. A recent controversy disclosed the fact that boys at a mixed infants' school were being taught knitting, and it is notorious that subjects intimately concerned with the immediate welfare of the children and their future responsibilities are ignored. Qualifying examinations for leaving and matriculation include subjects of little or no practical use for future study or entrance to a career.

Compromise.

The age at which the student parts company with the official schoolmaster is determined mainly by social and economic conditions and not by the potential capacity to benefit by further study. Ranging as it does from 14 to 21, the chief characteristic of the standard attained is variety. But once again, by way of compromise, ample facilities are provided for after-school education whereby the ex-scholar may pursue knowledge for its own sake or to obtain the special vocational training required for a particular career, and, if the system be lacking in uniformity, it is at least comprehensive enough, and gaps left in the official scheme are filled in by voluntary

effort in the shape of correspondence colleges and the like, so that no one to-day who has the capacity and the desire need lack the educational equipment for rising to the top of his profession.

Another example of compromise in this direction is furnished by the older universities and public schools. Under force of public opinion those strongholds of the ornamental have been equipped to promote utilitarian ends, but it is left at that, and, while the student who avails himself of such equipment is honoured and respected, no worse is thought of the student who does not. *Alma Mater* is equally proud of its double first and its double blue, and the old school tie is the common passport anywhere.

Further, while adhering to the measurement of results by examination, after-school rewards have little relationship to the academic qualification obtained, and there is no bar to the unsuccessful student being eminently successful in after life nor guarantee against the successful one proving a failure. As an illustration of this typically British habit of paying tribute to the Academic School by prescribing certain educational standards for a particular purpose and then, in practice, setting these at naught, a story is told in a recent biography of Labouchère of a friend of his who, desiring to join the Diplomatic Service, was coached and presented himself for the qualifying examination. He could not answer a single question and, much to his own surprise, was accepted. Labouchère was also surprised and took steps to find out privately from one of the examiners the reason why. The explanation given was that, while quite true that his friend could not answer a single question, the examiners were so impressed with the competent way in which he had faced a particularly embarrassing situation that they decided he was well qualified for the Diplomatic Service.

Specialization.

Then again, while recognizing the necessity for specialization and providing in our educational system for the appropriate training, the lack of this or any vocational training at all is no positive bar to success, except in certain exclusive professions. Indeed, some of the more outstanding successes in life have been the amateurs or the self-taught and, as if to show our complete impartiality, many who have been trained in one vocation achieve success in another for which they have no orthodox qualifications.

A modern example of this is furnished by Sir John Reith, who graduating as an engineering apprentice became, in turn, an Officer in the Royal Engineers, a Civil Engineer with the Admiralty, a Liquidator of Ordnance and Engineering Contracts for the Ministry of Munitions, Manager of a large Engineering Works, Managing Director of the British Broadcasting Corporation, and is now Managing Director of Imperial Airways.

Our more Gilbertian achievements in this direction are the successive occupants of high office in National and Municipal affairs, where expert qualification is the last thing expected of a Secretary of State or Chairman of Committee. Sir Henry Lucy in his memoirs tells of a newly appointed Secretary of State for the Colonies who asked him if he could tell where the d——d places were.

Happily, such extreme cases are the exception rather than the rule. Nepotism, favouritism, accident, pushfulness, bluff, each doubtless accounts for many of the apparent successes in life, but in general, and to-day more than ever before, "the tools are to those who can handle them," and a good sound general education rounded off by a good sound professional or vocational training is an asset of the utmost value.

But even these are of secondary importance compared with the more fundamental human qualities which make up personality and character or, more colloquially, "brains and guts." Without these the best education and training will not avail where positions of executive or administrative control are concerned, and there was a real significance in the remark of the darkie mother to her offspring, "You can't have no education, boy, and you'll jest have to use your brains."

Improving Native Talent.

To what extent personality and character can be altered it is hard to say, but it may be taken for granted that education can greatly improve the native talent by training and development, just as grinding and tempering may improve the cutting quality of the steel of which the tool is made. Similarly, it may enlarge the native capacity by providing the means of utilizing the accumulated knowledge and experience of other men and other ages and of conserving time and energy in the pursuit of such knowledge or of the knowledge which comes from original research.

Further, while it is true that the accumulation of knowledge frequently reveals the extent of our ignorance and thus favours the development of an inferiority complex, the usual effect is in the opposite direction and, in this way, it is indeed true to say that "knowledge is power."

We are familiar with the prospectus of the educational system which guarantees to dispel that inferiority complex, inspire confidence, and secure promotion by easy stages to the managing directorship, and, though absurd in the extravagance of their claims, the promoters have something to offer. Our Educational Authorities might well take a leaf from their book and include in their curricula the elementary principles of system and method; even a course of abstracting, indexing, and filing, at an early stage would be of inestimable value as a preparation for after-school education and professional purposes.

Then again, in the wider sense in which education embraces the experience of life, it may work miracles. Carlyle has said "there is no school like experience, even though the fees are dreadfully high," and Kipling in other vein describes the raw recruit getting licked into shape:

"But day by day they kicks 'im which helps 'im a lot,
Till 'e finds 'isself one mornin' with a full an' proper kit;
Gettin' clear o' dirtiness, gettin' done with mess,
Gettin' shut o' doin' things rather-more-or-less;
Not so proud of abby-nay, kul, nor hazor-ho,
Learns to keep 'is rifle an' 'isself jus' so! "

More indirectly, it is possible to benefit from the experience of others by cultivating a taste for reading and the systematic study of current technical literature, by the personal contacts to be obtained through membership of technical societies and the preparation and discussion of Papers on matters of practical interest.

Education and the Gas Industry.

So far, what has been said about education has, I am afraid, been of a very general and discursive character, but, I hope, not altogether irrelevant, as it was intended to indicate the background into which present-day experiments in education have to fit and in relation to which they have to be judged. Further, the Gas Industry, in common with all other industries, has an interest in the results of the national system of education, since it determines the equipment of the youth entering the Industry and conditions to a great extent the earlier stages of any special educational system which the Industry seeks to provide for its operatives.

In its earlier days, the operations both inside and outside the gas-works were simple in character. The absence of competition and the limitation of dividends encouraged empirical methods and retarded progress on the technical side. The relatively large amount of heavy manual labour involved favoured the selection of managers and foremen according to their practical experience and their ability to handle men, rather than an intimate knowledge of the chemical and physical character of the processes involved. The earliest attempt to provide technical training in the Gas Industry, of which we have any record, was through the agency of the Society of Arts which, in 1874, included in its syllabus the "Manufacture of Gas." In 1879, the work was taken over by the City and Guilds of London Institute and, under its auspices, the "Manufacture of Gas" continued to provide a course of study embracing all that was then considered necessary for the technical equipment of the "compleat" gas manager until 1908. Then, as a result of development on both the manufacturing and the supply sides of the Industry, "Gas Supply" became a separate subject.

This was but one symptom of an important change which had been taking place within the Industry, the result of a combination of circumstances, chief among which were the growing demands of organized labour for higher wages and better working conditions, increasing competition from electricity, and the stimulus arising out of improved educational standards.

Within the gas-works it found expression in the mechanization of its operations, improvements in methods of produc-

tion, and the application of more scientific methods of control to its processes. Simultaneously, but more slowly, it found expression outside the gas-works in a growing appreciation of the economic value of service and of the possibilities of extending the uses of gas in many new directions. But, if slow in starting, developments on the Supply side have, within recent years, taken place with increasing rapidity, with the result that to-day as high a standard of technical training is required for the Supply as for the Manufacturing side.

This view finds expression in the latest amendments to the Educational Scheme of The Institution of Gas Engineers, which recognize the same standard for both Manufacture and Supply in the examinations which qualify for membership, but it is doubtful whether the view is generally held in the Industry, and this appears to be confirmed by the comparatively small number of candidates for the Diploma in Supply. I venture to suggest that if the importance of a high standard of technical training for the Supply side were really appreciated, no aspirant to a position of executive or administrative control who seeks to obtain the Diploma in Manufacture, as a matter of course, would rest content until he had obtained the Diploma in Supply as well, and I would go so far as to suggest that the Hall Mark of the "compleat" gas engineer should be the double diploma.

Changed Conditions.

Another aspect of these developments is the tendency towards specialization in the Industry. In the smaller undertakings one man has still to play many parts. He represents the general practitioner of the Industry and as such has to face the daily problem of the works, the district, and the office. That he is capable of doing this efficiently is proved by the fact that, judged by recognized standards of good management, many smaller and medium sized undertakings compare favourably with larger undertakings.

In the larger works, however, specialization is an essential feature of the Industry; not only have production, distribution, utilization, and service become separate professions, but within each of these in turn there are specialized jobs for which special knowledge, special training, and special aptitude are required. This, again, has been recognized by The Institution of Gas Engineers in recent amendments to the by-laws according to which the chemist, the physicist, and the engineer are accepted for membership on equal terms, subject to approved practical and educational qualifications.

While this tendency towards specialization on the technical side of the Industry has been proceeding, developments have been taking place in the same direction in other departments of the Industry's business. I need only refer to the special organizations which have been created for dealing with commercial, legislative, publicity, and labour problems on national lines. These have been found of incalculable value to the Gas Industry, not only in respect of the highly specialized services which have been created and placed at the disposal of even the smallest undertaking, but in respect also of the greater freedom it gives the majority of gas managers to concentrate upon their own local problems.

Another modern development in this connexion is the tendency towards the amalgamation or the group control of separate undertakings, and this, while it is bound to reduce the number of positions of full individual responsibility, is also bound to increase the number of key positions where specialized training and a high standard of education are essential.

For the reasons mentioned, the outlook of the youth entering the Gas Industry to-day is very different from what it was even a few years ago, and the main facts which he has to face are these: There is a diminishing number of positions of individual responsibility where a general knowledge of many things is the most important asset, apart, of course, from personality and character, but there is an increasing number of positions where specialized knowledge and skill are essential, and the question naturally arises, what is the most suitable course to pursue in order to qualify?

For the more highly specialized work, such as research, there can only be one answer—viz., the very best school and university education obtainable—and the importance of this work is such that the Industry should be prepared to remunerate on a scale which will not only attract but retain suitable men, rather than leave it to be regarded as a stepping stone to some more highly remunerative position in which those special qualifications would no longer be directly useful.

For the more general technological work of construction, manufacture, distribution, and utilization, the value of the university training is less apparent, and there is probably little to choose between the products of the universities and public or secondary school boys who graduate by way of the works and evening classes, provided they are the right type of men; and on the engineering side there is much to be said for the preliminary training which is to be obtained in the works and drawing office of the contractor or appliance maker.

For positions of administrative responsibility, as already stated, a knowledge of business management is important, and that in proportion to the degree of responsibility and the extent to which the work of administration can be departmentalized under the supervision of specialists. No rigid rule can be laid down, but it is safe to say that the more the junior technical assistant knows about general business management the better, and it is equally true that the more the administrative head of even the large undertaking knows about the technology of the business the better.

At the other end of the scale we have the problem of training the craftsman, and this is a matter of great importance to the Industry because of the large numbers required in various capacities on district work, where the ordinary methods of workshop supervision are impracticable and the training of the young has to be imparted usually while he functions as the "fitter's mate."

Training for Distribution and Utilization.

Another difficult problem related to this is the training of inspectors, foremen, and canvassers for distribution and utilization work. The usual practice is to recruit these from the ranks of craftsmen, but the early start and limited education favoured for craftsmen are incompatible with the educational standards required for foremen and technical supervisors. There is always a certain proportion of craftsmen whose natural ability and ambition enable them to surmount these difficulties and make good; every encouragement should be given to such, but only by the selection and training of youths with the higher standard of education can the proper standard be obtained for those employed in supervising the work and representing the Industry on the district.

At the 1937 Meeting of The Institution of Gas Engineers a Paper was read describing in detail how such training was provided in connexion with the outdoor staff.

We do not hear so much about training for the Manufacturing side, but there is just the same need for progressive training here, and it is in the interests of both the Industry and the trainee that ample opportunities should be given of acquiring first-hand experience of operations in the various departments of the business.

This implies an obligation on the part of the ambitious junior, who thus benefits, not to be too impatient with the speed at which promotion comes and not too ready to take advantage of openings offered elsewhere, without regard for the debt he may have incurred at the hands of an indulgent employer. As a check on this, it has been suggested that a system of transfer fees might be adopted such as prevail in certain sporting circles.

Question of Remuneration.

Another obligation which devolves upon the undertaking is the adequate remuneration of those who have the necessary qualifications when the appropriate position is found. Judging from the scale of salaries offered in connexion with recent appointments advertised, this is not always appreciated by those responsible, and the results cannot but be harmful to the undertakings concerned and to the Industry generally. It is equally true, however, that the junior who fails to live up to the claims made in his application is to blame for this state of affairs, just as much as the undertaking which, systematically, under-estimates the value of services rendered.

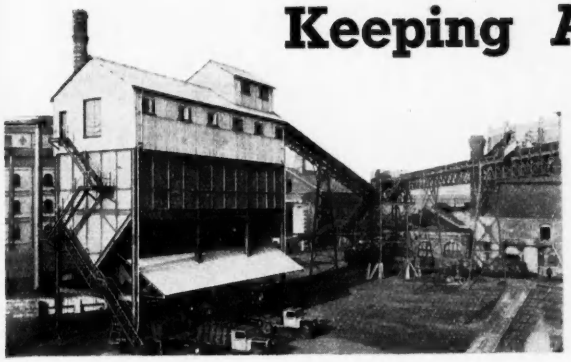
From what has been said it may be inferred that, in my opinion, there is no royal road, educationally, to success in the Gas Industry, and a survey of the prominent figures of to-day will confirm this; but the survey will also indicate that the old saying about the private soldier having a marshall's baton in his knapsack is particularly applicable to the Gas Industry, and there is still every incentive to the junior, who comes into the Gas Industry in almost any capacity, to regard it as a great advantage in which industry and virtue will ultimately carry him to heart's desire.

Keeping Ahead at Ipswich

by

W. J. COLLINS GARRARD, A.M.Inst.C.E.

From a Paper read before the Eastern Counties Gas Engineers' and Managers' Association at their Autumn Meeting in London on Oct. 20.



A View of the Coke-Screening Plant.

During my service since 1914 at Ipswich I have seen the make of gas grow from 562 to 1,012 millions per annum. This has naturally meant gradual re-organization right through the Undertaking from coal-handling to the consumers' meter. Therefore, I propose to tell you how the various situations that have arisen have been met.

Ipswich was one of the first companies to install continuous vertical retorts

When I arrived at Ipswich in June, 1914, the settings had just been put to work, and for my first three months I did very little else but act as relief stoker. Practically the whole staff of the erecting firm came down during the ensuing year. I relate these details to show you how lucky I have been to have seen verticals progress from their introduction to the success they are to-day.

Mr. Chas. E. Wright, present Chief Engineer to my Company, in his Paper to this Association in 1919, said: "The advantages of verticals with us at Ipswich are as follows: The make of gas per ton of coal is excellent, there is no stoking machinery day or night, and the coke-handling plant is simple. The make of gas per retort runs from 40,000 to 60,000 cu.ft. per twenty-four hours. Thus it will be seen that under normal conditions the retort house, consisting of thirty-two retorts, would produce round about 1½ millions in the twenty-four hours. At this time the thermal yield per ton rarely exceeded 70, which was considered good.

The town of Ipswich has grown steadily, and as a result each succeeding year has shown its 4 to 5% increase in the demand for gas. By 1929 the output had increased to over 800 millions. In this year the Woodbridge Undertaking was acquired and gas was supplied from Ipswich Works, and in 1931 Felixstowe, too, was absorbed, high-pressure mains laid and all gas was made at Ipswich. Thus over 900 millions was the output for 1932.

To meet the ever-growing demand a very great deal of experimental work was carried out in these settings between 1919 and 1932. As a result the same retort house was able to produce all the gas that was necessary year by year. To-day, well over 100,000 cu.ft. of gas per retort is obtained in twenty-four hours, while the thermal yield is round about 80.

Examination of the details of modifications made to the original 1913 installation shows that this consists chiefly of alterations to the recuperators and producers, giving a more efficient heat control, and the change-over from fireclay to silica retorts, which helped to increase the output of gas obtainable from the same ground space.

In 1925 one half of the retort house was completely reconstructed. The 57½-in. retorts had a 19-ft. silica belt in place of fireclay and the minor axis was increased from 8 in. to 9 in. at the top.

The producer grate was altered from the horizontal bar type to the modern step grate and certain recuperator alterations were made. Two years later the other half was similarly re-set, the minor axis being increased by another inch.

In 1934 and 1936 respectively, further reconstructions were carried out, the only additions being that hollow division walls were so placed in the settings as to divide them up into four quarters instead of two halves. This will enable us to reconstruct less of the retort house at a time, obviating the use of other and less efficient coal gas making plant during the reconstruction period.

With downwardly-heated continuous verticals it is undoubtedly, in my opinion, essential that the coal used is really suitable for easy travel through the retorts—*i.e.*, a coal which does not swell to any large extent when carbonized. Rodding is brought to a minimum, thereby reducing labour and repair costs; the coke produced is particularly easily steamed, giving a high thermal yield. In addition, the throughput is very much larger than can be obtained with a swelling coal, again reducing labour costs. To-day our throughput varies from 5 to 6½ tons per retort per day as against 3½ tons in 1919. Actually, we can now produce practically double the amount of gas from this retort house that we did twenty years ago, and this, in my opinion, is mostly due to choice of coal.

The retort top and bottom ironwork is still practically the same pattern as in the 1913 installation, but naturally the foul mains leading from the retort house have had to be increased, as has the retort house governor. In place of one 18-in. main and one 12-in. governor, we now have two steel 18-in. mains and two 18-in. governors, one for each end of the retort house. Each bed of four retorts has its own furnace and the grate area of these has been considerably increased since the early days to keep pace with the augmented throughput.

A waste-heat boiler was added in 1929 with an evaporation of 1,000 gall. per hour. This supplies the whole of the steam necessary for the retort house and sends its surplus to the general works supply.

As I have said, with downwardly heated continuous vertical retorts the best results are obtained when the coal carbonized is suitable for easy travel through the retorts—in our case Yorkshire coal with a small percentage of Durham. This latter stiffens the coke, improves its colour, and reduces the percentage of breeze. It is important that supervision should be methodical, careful, and constant from coal hoppers to coking out. It should preferably be in the hands of the staff, and the more time a chemist can be spared in the retort house, the better. Working heats should be constant, with the bottom heat regarded as the more important because of steaming. For effective steaming, the steam should enter as high up the bottom casting as is possible. The regulating valve should be right at the casting. Quenching water should enter well below the steam inlet. This assists in preventing condensation of the steam, while it is of great advantage to use superheated steam to avoid initial condensation. Great care should be taken to ensure tightness in the retorts to prevent loss of gas through to the CO flues. Spraying with a suitable cement and the use of a cement gun after scurfing should be insisted on. Before putting to work again the retort should always be put under pressure while empty by opening the CO tiles and closing the control tiles. A little tongue of burning CO will appear at any leak. No trouble should be spared to prevent the drawing-in of air into the gas stream. This is considerably helped by grouting-in with fire cement around the retort top casting after scurfing. By this means the risk of firing the gas is diminished and the inerts content is kept low. If heavy steaming is carried out as in our case, adequate spraying to foul mains and retort house governor is essential. This is necessary to prevent

accumulations of pitchy tar, which cause back-pressure and bad working conditions.

Coal Handling, Screening, and Distribution.

In 1919 the total coal carbonized at Ipswich was 34,630 tons, with an actual sale of 9,377 tons of coke. By last year this had risen to 57,347 tons of coal and 24,084 tons of coke.

The increases have, of course, been gradual, but a point was reached in 1936 when something had to be done about it. Our coke-handling plant had become quite inadequate. The whole of the coke made was produced in the vertical retort house in 1937. At that time the total screened coke storage was 40 tons. The unscreened coke was conveyed from the retort house to the screen and hoppers by push bar conveyors. Trucks could be loaded direct from the hoppers, but all bag loading was manual—*i.e.*, the coke had to be picked up from the coke floor and loaded by forks into the bags. Weighing was done on bob-up weighing machines.

A coke conveying, screening, and loading plant was designed in 1936 and erected in 1937. It consists of a series of rubber and canvas belt conveyors, leading finally to a pair of screens situated at the top of a hopper system, of which the storage capacity is 300 tons.

The grading is carried out on screens which we have gradually developed at Ipswich. These run at the slow speed of 100 revs. per minute. The bagging and loading of all coke is carried out from the bottom platform—whether it be trucks, lorries in bulk, or bagged coke. An automatic weighing system is installed at one side of the bagging platform, which is raised from the ground. This enables bags of coke to be run straight on to lorries in a sack barrow. We made this bagging platform of sufficient size to store 9 tons of bagged and weighed coke. Thus the weighers can get a stock ready and lorries can be loaded immediately they back up to the platform.

At a maximum six men are required to do the whole of the bagging and loading of bags on to our lorries in the height of winter, a saving of at least ten men. Lorries can also run underneath the centre of the hoppers and be filled in bulk from chutes. Further chutes deliver from the other side of the hoppers into railway trucks standing on our siding.

A weighbridge of 30 tons capacity, with a modern ticket printing steel yard, was incorporated in the scheme. Simplicity is once again the keynote of this important piece of apparatus, the most notable features of which are as follows:

(1) The hopper system consists of a steel frame 64 ft. high built in with blue bricks with expanded metal reinforcements every sixth course.

The bottom of the hoppers are steel plates with blue tiled linings, and the divisions in the hoppers are all of blue brick. Every chute both in the hopper system and from conveyor to conveyor is lined with blue Staffordshire tiles.

(2) The screens are of the reciprocating type and are in duplicate. Each screen consists of two trays working in opposition in order to obtain balance. The trays are 9½-in. by 2-in. pressed steel channels with perforated bottom plates. They are suspended by forged sling bars from self-contained structures heavily braced to damp any vibration. The screens are hung at an angle of 4° from the horizontal and receive their motion from a central forged crank shaft giving an approximate 12-in. movement to the trays. The crank shaft is belt driven from a 10 h.p. motor.

The perforated plates consist of welded steel rods of a suitable size first to extract the dust, and then to produce nuts, broken coke, and large coke. As previously mentioned, the speed is only 100 revs. per minute—comparatively slow, with a consequent lack of vibration.

(3) The conveyors themselves are rubber and canvas heat-resisting belt 24 in. wide—5-ply with ⅛ in. of rubber on the carrying side and $\frac{1}{16}$ in. on the back. Their capacity is 20 tons per hour of uncut coke and they travel at 120 ft. per minute. The fact that the belt is itself travelling with the coke tends at any rate to avoid any further crushing, with the consequent reduction of breeze content.

(4) All the gears are totally enclosed worm-reduction type, which avoids noise and possible danger from big gear wheels or pulleys. Only 4 h.p. is required to drive any one of the four belts. All the motors and gears are interchangeable.

(5) Every staircase on the plant is inclined at least 45° from the vertical, rendering access to all parts of the plant easy and safe. Likewise for safety's sake all steps are of wood, as are all the platforms alongside the conveyors.

Owing to the speed of the mechanical weighers the waiting time of lorries in the yard, especially in the height of winter, has been reduced considerably—at least 50%. This is a great advantage for both our own lorries and those of the merchants.

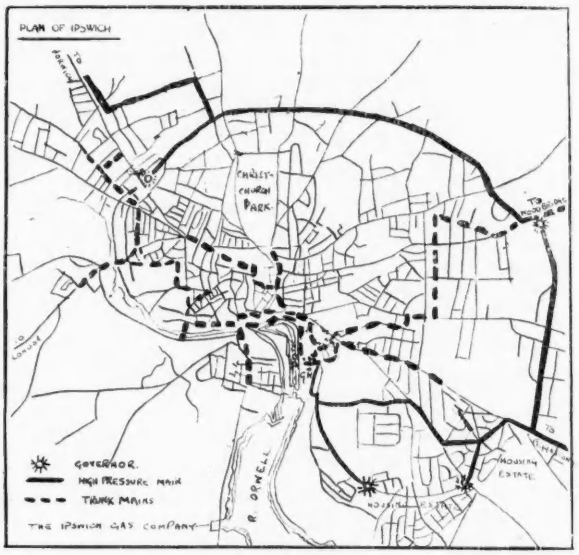
The new plant will mean a very great saving to us in repairs and maintenance. With the old system of steel push-bar conveyors the cost annually was considerable. At the moment it is early to talk, for the new plant has been running scarcely a year, but so far no repairs have been necessary.

The rubber belts will, of course, be the big expense when they wear out, but they have a reputed life of 250,000 tons, which in our case is about seven years.

The plant is certainly a very fine one and is a tribute to the engineering skill of our Chief Engineer, Mr. C. E. Wright.

Coke Distribution.

The local distribution of coke at Ipswich is carried out both by ourselves and by merchants. Our direct trade is again



The Ring Main.

divided into two groups—viz., quantity (¼ ton or over) and retail. This latter business, which consists of selling 1s. bags of broken coke delivered to the consumer, has been a great success.

Records were first kept in 1927, and during that year 11,280 bags were sold. We increased this total during 1937 to 60,319 and consider the amazing increase is due largely to the following points:

(1) Good dry coke.
(2) Regular, unfailing, and courteous service.
(3) Intelligent advertising.

However much an article is boosted it will never continue to sell if it is not good value for money. We have, therefore, paid great attention at Ipswich to the preparation of the broken coke distributed in these 1s. bags. It is clean, bright, low in ash and water content, and very easily lighted. It is only by keeping it as such that we shall maintain the sales we have attained.

Our lorries cover the town regularly, each driver having his own daily round. Thus the housewife can rely on getting her supply on the same day each week. The drivers have

been carefully chosen and given instruction in salesmanship, with excellent results to themselves and the Company.

Originally this method of selling coke was brought to the notice of the public in the local morning and evening papers at the week-end when the sales of the papers concerned were the biggest. In addition, slides were shown at the local picture houses. It is gratifying to record that the high quality of the coke is now its own advertising medium.

Gas Purification.

It naturally follows that with the works nearly doubling themselves during my service, considerable additions and replacements have been made to the wet and dry purification plant.

In Mr. Wright's 1919 Paper he said: "Five years ago I ran through a winter forcing gas against 60 to 80 in. of pressure." In 1918 this pressure was round about 40 in., when making 3 millions a day. During last winter when it was necessary to produce four millions in twenty-four hours, the pressure at the point already mentioned was considerably less than 40 in. Undoubtedly this reduction is partly due to a complete enlargement of the mains system. Where we once had 15-in. and 18-in. mains mostly underground, we now have 24-in. and 30-in. mostly overhead. This has been an enormous boon and decreased our works worries considerably.

Since the advent of heavy steaming the volume and temperature of the gas leaving the vertical retort house has considerably increased, necessitating, as already mentioned, larger foul mains and retort house governors and further condensation plant. We put in a water-cooled condenser which has given us good service and no anxiety.

Owing to the production of increasing quantities of tar and ammonia, a further Livesey washer was added in 1929, together with a static ammonia washer of our own design. These, together with the rotary brush scrubber-washers (three in number) have proved equal to the task of ammonia removal throughout the years.

Gas Storage.

The first waterless holder in the British Isles was erected at Ipswich. Quoting Mr. Wright once more, in his 1919 Paper is written, "Our gasholders are 1 million and ¾ million capacity, so that it will be seen that we are sitting upon a volcano as regards storage." Fortunately, the volcano only kept on rumbling and did not blow right up before action had been taken.

Thanks to the initiative and courage of Mr. Frank Prentice, our then Engineer and Manager, our 2 million M.A.N. waterless holder was put to work in 1927, and immediately many worries disappeared. The theoretical advantages of this type of holder are now well-known, but only by actual experience with a waterless holder can they be realized to the full.

I think I am right when I say that there are not many waterless holders in the Eastern Counties. In spite of this, however, it may interest you to know that we still think as highly as ever of our waterless holder. Its property of giving almost constant pressure irrespective of the amount of gas in the holder, is a tremendous advantage. The fear of a drop of pressure through uncupping is removed. The amount of water deposited in our syphons and services continues to be low, as mentioned in Mr. Frank Prentice's Paper in 1930. This is, of course, due to the fact that whatever the moisture content of the gas entering the holder, it is certainly no more on leaving, as can happen in a water-sealed holder. Another agreed advantage is the lessening of the possibility of corrosion in the holder plates, due to the absence of water. We have had no serious troubles with this holder during the past eleven years. We are faced at the moment with a possible change of the sealing tar in the near future. This tar is showing signs of emulsion and might give us trouble during a really hard winter. The change-over is quite a simple matter. We increased the pressure given by this holder by adding to the number of concrete blocks on the top of the piston. The ease with which any change of pressure can be accomplished is a great point in favour of this holder, as is the fact that its capacity can be increased without putting it out of commission.

Distribution.

Ipswich has been fortunate in having had several housing estates built from 1919 inwards. It became necessary to run a new 12-in. trunk main from the works, and to extend both another 18-in. and 12-in. main to these housing estates. In 1921 quite a small town was added in the shape of the Nacton Road Estate, with a further extension of the trunk mains and the laying of several miles of 6-in. main.

It was fortunate indeed that the additional 12-in. trunk main mentioned above was laid when it was, for in 1928 Woodbridge was amalgamated with Ipswich. It was decided to supply this town by means of a 12-in. low-pressure main, the idea being to control the Woodbridge pressure from the Ipswich Works. However, as so often happens, the coming of gas along the Ipswich to Woodbridge road led to development of the property. By the time the 12-in. main reached Woodbridge, it was found that the pressure was inadequate on Saturdays and Sundays during the dinner time period—viz., 12 to 2 p.m. This was overcome for the moment by connecting up to the Woodbridge holder and using it when necessary.

In 1931 Felixstowe was absorbed, and a high-pressure main was laid right from works to works. In this case the Felixstowe distribution system was left intact, the works being used as a holder station. By August, 1931, the Felixstowe Works was shut down and all gas manufactured at Ipswich. Once again the arrival of gas synchronized with a boom in building, and a governor had to be installed and a connexion made from the high-pressure main to the low-pressure system on the newly developed outskirts of Felixstowe.

All this time Ipswich itself was still growing, particularly as a by-pass road was being built round the town. This road provided a solution to an ever-increasing problem. A 10-in. high-pressure ring main was run in the grass verge of this by-pass road, and it was connected to the Felixstowe high-pressure main. Governors were installed and connexions made to the Ipswich low-pressure system from this ring main. In this way the 24-in. low-pressure outlet main from the works was greatly relieved by the backing up of the high-pressure main all around the edge of the town.

Mr. Wright in his 1919 Paper gave some figures showing hourly outputs. At that time we were up against the problem of supplying at adequate pressure 213,000 cu.ft. between 12 noon and 1 p.m.—or at the rate of 5,100,000 during the 24 hours. When I tell you that during December last we sent out 462,000 cu.ft. in the same hour, or at a rate of over 11 millions in 24 hours, you will realize what a godsend this ring main and our waterless holder have been to us. Incidentally, this figure does not include the gas pumped to Felixstowe, as this is carried out in the early morning hours.

When the high-pressure main was first laid we installed a duplicate set of boosters each of which could pump 50,000 cu.ft. per hour at a pressure of 5 lb. With the addition of the ring main and the need for increased initial pressure and volume we had to put in larger boosters.

Swimming Pools.—We have been fortunate to secure on two occasions contracts to heat outdoor swimming pools. The first was erected in 1937 to serve the new housing estates already mentioned. The pool was 150 ft. by 37 ft. 6 in., and the depth from 9 ft. to 2 ft. 6 in. with a capacity of 210,000 gall. Heating was carried out with a gas-fired boiler, and the temperature was easily maintained at 70° F. The installation has been a complete success, so much so that the second followed in April, 1938. This serves the other end of the town and its capacity is somewhat larger—two boilers being necessary for maintaining the required temperature.

In addition, the refreshment cafés erected at both pools are fitted throughout with gas appliances for cooking, water heating, and lighting. The gas consumption is not, of course, enormous, but it keeps our product in the public eye.

Cooker Repair Shop.—For many years slot cookers had been repaired under very difficult conditions at the Town Office fitting shop of the Company. A somewhat bold step was taken in 1933-34, when a new building was erected at the works, and machinery installed for completely dismantling, repairing, and redecorating this class of cooker. It was bold inasmuch as we did not know what we were up against. Dirty old black cookers came into the shop and went out resplendent in their new grey finish, with vitreous enamelled doors and cornices.

Having started the ball rolling there was nothing for it but to go on—with the result that since the shop was opened over 17,000 cookers have been renovated. Undoubtedly it

was a wise step as it has stopped the installation of many electric cookers.

Demonstration Theatre.—For some years it has been a custom of my Company to hold cookery demonstrations twice a week. They have proved very popular, and recently the attendance has been such that "House Full" notices have had to be exhibited. As a result a scheme was prepared by our General Manager and Secretary, Mr. G. A. Mallett, for considerably enlarging the floor space. At the same time the floor has been raised, thereby giving an uninterrupted view of the demonstrator's work. Tip-up seats have added to the comfort of those attending the lectures. An up-to-date kitchen with every convenience, placed on the stage, greatly aids the demonstrator's work. Many other up-to-the-minute features have been incorporated, the chief of which is a lantern which operates at the back of the screen. By this means once more, the whole audience has a clear view.

Discussion.

Mr. W. W. TOWNSEND (Colchester), in a written contribution, said that it was quite apparent that the Ipswich Gas Company carefully studied every question, and it was easy to understand the success of the Undertaking, which was reflected in the remarkably low price of gas, and the continual growth in output.

The method of handling coal in the store with a mechanical shovel was interesting. Those who depended upon sea-borne coal for their supplies would appreciate the importance of this question. At Colchester other methods had been adopted, which suited their particular layout. They had, said Mr. Townsend, a long and narrow covered coal store, which could be completely filled by a band conveyor, and the coal was reclaimed by means of a De Brouwer type of conveyor in a tunnel. In addition, coal was stored on the quay in an open store with concrete walls, the dockside crane unloaded direct into the store, and the same crane reclaimed the coal when required for use. This he found a very cheap and efficient method.

The description of the continuous vertical retorts and the increased throughput obtained by various modifications was very striking, and the evaporation of the waste-heat boiler was given as 1,000 gallons per hour, but presumably that was the maximum obtained in the winter. It would be useful to know the minimum, and whether it was necessary to supplement the supply of steam by constant use of Lancashire boilers. Mr. Garrard stated that he used Yorkshire coal with a small percentage of Durham. It would be interesting to know the arrangements for blending. Special care was taken to keep the retorts gas-tight, and he would like to know the percentage of inerts in the gas, also the specific gravity, and the A.T.B. number.

He had had the advantage of inspecting the new coke-handling plant, and he considered it one of the finest he had ever seen, and he congratulated Mr. C. E. Wright on the success of his coke screen, which was highly ingenious. The methods adopted for the distribution and sale of coke were very complete and highly successful, and this section of the Paper would repay careful study.

With regard to purification, it would add to the value of the Paper if they could have some figures as to the capacity of the main purifiers and the catchboxes. It was generally considered that the latter might be relatively small, and he would like to know the Ipswich practice. He noted that dry sealed purifiers were installed as catchboxes in 1921, and that the valve system was still hydraulic. He would like to point out that where dry sealed purifiers were used it was desirable that there should be some form of safety seal between the purifiers and the gasholders. He remembered an experience 30 years ago when the foreman in charge shut, by mistake, one holder inlet valve before he opened another. The catchboxes at that works had the old-fashioned water lutes, but the tremendous pressure burst the fastenings, and blew the cover right off so that it was standing at an angle of about 45°. Warned by this experience he had had all the holder valves at Colchester fitted with a safety arrangement. All the holder inlets were worked by one key, which could not be taken off unless the valve was opened. Notwithstanding this precaution, he thought that there should be a safety seal on the outlet of the purifiers large enough to prevent the pressure on the covers rising above the safe limit.

Mention was made of the waterless gasholder, which was famous as the first erected in this country. It would appear from Mr. Garrard's reference to the comparatively low water content in the gas distributed that this holder supplied the district constantly, and that the other holders were kept in reserve and only used occasionally. If this was the case it was the Ipswich practice to work in and out of the same holder. This could only be done when the coal was carbonized solely in continuous vertical retorts, and a straight line was obtained on the calorimeter at the holder inlet. One would have expected gum trouble on the district when the gas was stored for such a short period in a dry gasholder, and he would be glad if Mr. Garrard could give any information on this point. The method adopted in dealing with distribution was extremely interesting. From what he knew of the town, however, the by-pass road did not form a complete ring, but skirted the town on its western side, and the steps taken to augment the supply on the eastern side were not indicated.

The section dealing with the metamorphosis of the old black cookers would interest every member. His experience had been similar, and they had experienced the same glut of orders for the partly enamelled cookers which they supplied on simple hire. He supposed the Ipswich Company, like others, was wondering how long the 17,000 re-conditioned cookers would satisfy their consumers, and whether the time would come when the whole lot would have to be scrapped and nothing but modern enamelled cookers with automatic heat control supplied to the public. In the meantime, long-term hire-purchase was enabling consumers to obtain modern enamelled cookers at reasonable rates, and as the numbers increased the problem was gradually assuming more manageable dimensions. The figures given showed, however, the complexity of the question; assuming that the re-conditioned cookers were valued at £3 each, no Board would care to contemplate the writing off of £51,000 of capital at one fell swoop.

This also drew attention to a point which he had several times emphasized—namely, that the present rate of depreciation for income-tax was absurdly inadequate. At 10% on the written down value it took approximately 40 years to write off the capital expenditure, and he ventured to say that many thousands of stoves had been scrapped after less than ten years. This was bad enough when dealing with cookers, but when water heaters were hired the position was even worse. Unless gas companies were careful to obtain an allowance for obsolescence on all stoves and meters scrapped, in addition to the usual allowance for depreciation, their capital account would be unduly inflated. Last year the Colchester Gas Company was allowed £3,637 for depreciation of stoves; £214 for obsolescence of stoves; £2,472 for depreciation of meters; and £242 for obsolescence of meters.

Mr. T. V. JOHNS (Lowestoft) enquired as to the coal tonnage of the ships and whether it was possible to store the whole of one cargo at the necessary height to save elevating it again afterwards. Mr. Garrard had mentioned the high yield of 80 therms per ton; could he include with that figure the coke sold per ton of coal carbonized? He further asked if it was found necessary to break the coke, as he did not see any reference to such a plant in the Paper—or was the screening so efficient that the coke could be divided into the various grades without the use of a breaker? Mr. Johns commended the Ipswich Company on their coke delivery system, but added that his Undertaking adopted a retail card system, kept by a clerk, so that each consumer had an account by which the delivery could be checked. Mr. Johns also enquired if the Ipswich Company set any limiting temperature for working their purifiers. He personally wondered whether 80° was not rather too high. He suggested that the erection of a new gasholder at Woodbridge might be regarded as centralization, whereas in these days the trend was towards decentralization.

Mr. R. PRINCE (Peterborough), referring to spontaneous combustion in the coal store, asked how high the coal was stacked and what type of coal was used; was it all doubles or was there some slack mixed with it? In regard to spraying the retorts after scurfing, he asked if any special proprietary brand of cement was utilized and if any trouble was experienced during the first 48 hours after putting the retort back to work. With reference to steaming, Mr. Prince believed he was right in saying that the calorific value at Ipswich was 450 B.Th.U. Were any difficulties experienced in steaming down to that figure? When he was at Loughborough they used 100% Durham coal and had to steam down to 22½% to reach their calorific value. He asked whether Mr. Garrard considered that upwardly heated retorts were easier to steam. Did he understand that the coke lorry drivers received commission? Also, had electrostatic de-tarrers been considered? In this connexion Mr. Blundell had lately given some interesting figures. Mr. Prince suggested that Mr. Garrard's information on the subject of purification would be of greater value if they could be told whether the boxes were heated in any way, in which direction the gas flowed, and whether oxygen was admitted, and, if so, at what point. They experienced trouble at Peterborough if they allowed the oxygen admitted at the inlet to exceed 1·8%. This gave 0·4 or 0·5% at the outlet. Mr. Prince enquired what was the naphthalene content with downwardly heated retorts. Were they to understand that the tar seal in the waterless gasholder was being changed for the first time for eleven years? So far as the cooker repair shop was concerned. Mr. Prince remarked that he still maintained the belief that the most efficient piece of machinery for dealing with old cookers was the sledgehammer—in conjunction with which long-term hire-purchase should be adopted to enable all consumers to acquire new all-enamelled appliances.

Mr. R. LALLY (Braintree) asked how much money was saved by emptying the purifiers every four months.

Mr. P. D. WALMSLEY (Great Yarmouth) said that they had a long coal store—some 130 ft.—at Yarmouth, and they received coal by water—650 tons at a time. They used to have some trouble with the coal at the end of the store through its not getting moved for considerable periods, with occasional resultant fires. The receiving

conveyor was more or less in the centre of the store. Supposing heating occurred at Ipswich at the far end of the store, how did they get at it with the mechanical shovel. At Yarmouth they had underground tunnels with slides so that they could empty any portion of the store very quickly; there were some eight or ten of these slides in the 130 ft. length of the store.

Mr. W. H. BLUNDSTONE (Newark) asked whether the retail coke sales at Ipswich represented the use of open coke grates or whether consumers used it in coal fireplaces. He was interested in Mr. Garrard's remarks on the subject of gas-heating for swimming pools, but wondered whether the figure of 70° was not rather high, particularly in the earlier part of the year. Was this regarded as the minimum figure throughout the whole year?

Mr. C. B. STANIFORTH (Ely) asked if Mr. Garrard could give them the cost per therm into holder, together with the ordinary price of gas. Also, had they any substantial central heating load. Mr. Garrard had referred to the great expansion of the Undertaking since 1919. Was this due to an increasing number of consumers or to greater consumption per consumer? Could he give them the consumption per consumer figures for the two years—namely, 1919 and 1937? Mr. Staniforth also enquired how much coke was put in the 1s. bags and how did it agree with the L.C.C.A. scheme.

Mr. H. H. REDWOOD (Newmarket) wondered if the increased gas production per ton of coal carbonized was due to higher heats. Had Mr. Garrard experienced any trouble in the hydraulic main? The original figure given for coke appeared to be 5¼ cwt. per ton of coal carbonized; but the present arrangements brought this up to 8¼ cwt. He took it that the saleable coke figure was after allowance for that used on the works. Had the coke sales been increased by using breeze in the producers?

Mr. F. H. ROBINSON (Bishops Stortford), in proposing a vote of thanks to Mr. Garrard, said that he had had two cases of spontaneous combustion in coal stocks—one at Manchester and one at Harrogate—and in both instances the conditions of stocking were the same. At Manchester the overhead gantry was 33 ft. above the coal store; at Harrogate it was at a similar height. In each case the fire occurred not after a period of years, but after some months. It was after the 1921 coal strike that they had in some freshly mined coal at Harrogate, which was dumped into the empty coal store from a height of some 30 ft. Thus fresh faces were exposed, and this went on all over the store. Four months later they had to dig out 4,000 tons. After the 1926 strike they put the coal in by means of a chute and let it slide down; they worked the wagon along and let the coal trickle down the face of the heap. There was no recurrence of the trouble. The ring main method of distribution was an excellent arrangement, and his own experience showed it to be very helpful when there was a growth in the size of the town. A high-pressure ring main not only supplied the outer districts but fed back into the inner district. Moreover, it was available for supplying gas to new areas which were being developed. The old "tree" system of distribution was not in accordance with their requirements to-day.

Mr. D. B. PARKINSON (London), in seconding the vote of thanks, enquired whether the maintenance of the waterless gasholder at Ipswich was expensive. Was there any automatic arrangement for feeding into the holder at Woodbridge?

The PRESIDENT (Mr. W. C. Chapman, of Boston) said that the extra coke sold represented 5·4 cwt per ton of coal carbonized. He supposed that a good deal was used on the works; nevertheless, this still seemed a somewhat low figure. He asked if Mr. Garrard found the perforated plates on the compressor more efficient or economical than the ordinary pressed steel plates. It seemed that the practice at Ipswich of emptying the purifiers every four months would tend to increase the labour charges. At Boston they found no difficulty in running for ten or twelve months without undue hardening. He was not quite clear whether in the stove shops at Ipswich they vitreous enamelled the cookers or merely stove enamelled them and fitted vitreous enamelled cornices obtained from the manufacturers.

THE AUTHOR'S REPLY.

Mr. GARRARD, replying to the discussion, expressed his appreciation of the keen interest taken in his Paper. He had abstracted all questions appertaining to each section of the Paper, and would answer under headings rather than reply to individual members in turn.

Coal Storage and Handling.

At the moment their arrangements for coal blendling were manual. The principle on which they worked was that each mechanical shovel load of Yorkshire nuts received its quota of Durham coal and mixed thoroughly with it in the conveyor boot. This was much more effective than dumping one half-ton load of Durham in the conveyor followed by four loads of Yorkshire nuts. An automatic mechanical scheme was now being erected to carry out the same idea. The boats bringing their coal varied in tonnage from 1,000 to 1,500 tons, and it had not been found practicable to store it at the necessary height to save elevating it again. The average height of their coal heaps was approximately 23 ft. and they enceavoured always to store washed doubles and run-of-mine coal quite separately. This enabled them to know exactly what coal they were using and in addition reduced the chance of spontaneous combustion. They had definitely found that mixtures of washed doubles and run-of-mine coal tended at any rate to heat up more quickly than when they were stored separately.

With regard to the mechanical shovel greatly diminishing the risk of coal fires, and Mr. Walmsley's query thereon, they always left room for the shovel to work, in spite of large coal stocks. Hence, they could immediately attack any warm spot with the shovel. Owing to its high rate of handling (50 tons an hour) the trouble could be reached and dissipated very much more quickly than by manual labour. Incidentally, they had an elaborate system of thermometers in tubes buried in their coal at 10 ft. intervals. These were read daily and action taken immediately when any abnormal reading was obtained.

Gas Production.

In the summer months the waste-heat boiler evaporated approximately 600 gallons per hour. They found it necessary to run their Lancashire boilers all the year round and they looked upon these latter as their main works steam supply. The waste-heat boiler merely sent its surplus steam to the main system after having supplied the needs of the vertical retort house. Their gas contained on an average 15% of inerts, consisting of 10% N_2, 5% CO_2, and 0·5% to 1·0% O_2, while the specific gravity averaged 0·5 when all coal gas. He was not yet able to give any indication of its ATB number.

They had no trouble with retorts immediately after scurfing and spraying, and no difficulty in steaming down to 450 B.Th.U. Upwardly heated retorts were reputed to steam more easily, but he had no first-hand knowledge. Undoubtedly, the higher heats they had been able to work at through the use of silica had helped to increase their thermal yield. At the same time he knew of two works producing over 80 therms to the ton. At one of these the custom was to work at an average of 100° C. lower in the retorts than at the other, and yet they both produced this fine thermal yield. He suggested that this supported the "coal" theory in the Paper.

With reference to the use of a solvent in the foul main, they had never found this necessary. The adequate spraying referred to in the Paper kept them clear of trouble. While on the subject, he would say that they had twelve ¼ in. sprays in use in the retort house. There was one at each governor inlet, one at the top of each down collecting main, and one above the smaller collecting mains from each of the 8 beds.

At present the selling price of gas at Ipswich is 8·6d. a therm, while the net cost into holders was 4·17d.

At the moment their central heating load was not very big, but it was definitely increasing. They had no fixed central heating rate. The question of annual consumption per consumer gave rise to an interesting point in their case. They had in 1919 18,417 consumers whose average consumption was 32,900 cu.ft. In 1937 they had 34,964 consumers with an average consumption of 25,800 cu.ft. There were several causes which had probably contributed to this drop in consumption per consumer, the chief of which were: (*a*) slum clearances, (*b*) increased efficiency of modern gas apparatus, (*c*) and the loss of the lighting load. Mr. Garrard suggested that this subject could be the topic of an interesting discussion, which incidentally might help to arrest this waning consumption per consumer.

Coke Handling, Screening, and Distribution.

They found it unnecessary to break or cut their coke, an adequate supply of each of the grades required being obtained by screening alone. This was first due to the type of coke produced in continuous verticals with their blend of coal, and, secondly, to their efficient screening arrangements. The President asked for information as to comparative costs of the new welded screens as compared with the old type perforated screens. They had found very little difference in cost, but the new type was very much more efficient. Referring to our 1s. bag trade, the weight in each of these bags was 45 lb., which was in line with the L.C.C.A. scheme They paid their driver salesmen 9d. per ton commission.

Regarding the "coke sold" figures given in the Paper, on this occasion they represented the amount of coke actually sold to the public during the years mentioned. Their usual practice was to give the figure of coke "made for sale." In this they included actual sales *plus* the coke used in the C.W.G. plant only. Any other coke used in the works was not included in this coke "made for sale." The current figure was just over 8 cwt., excluding breeze. In 1919 they used 4.040 tons of coke to make water gas, while in 1937 they made no water gas at all.

The use of breeze only in their Lancashire boilers had increased

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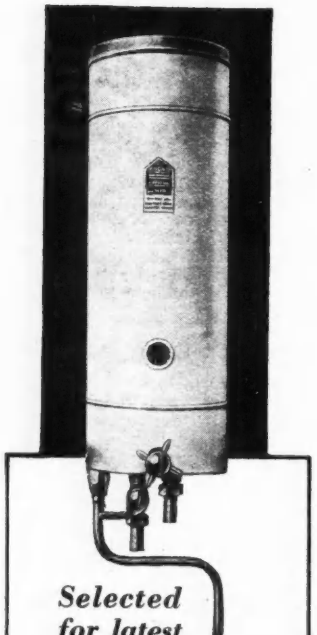

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Literature for your Showrooms available on request.

PRONTO

Instantaneous Water Heater

MAIN

R. & A. MAIN LTD., LONDON & FALKIRK

their "coke sold" figure, as had the small percentage used in the retort house producers.

In reply to subsequent written questions from Dr. E. W. Smith (Woodall-Duckham Companies), Mr. Garrard said that the water content of their coke never exceeded 5%, the volatile content was never above 1% (and often as low as 0·1%). The ash content varied from 8% to 10%. He asked what size coke they sold for use in open fires. This was broken coke varying from 1¼ in. to 2 in. They sold approximately 5% of their coke for open fires, 25% for household coke boilers, and 70% for other purposes. It had been a difficult matter to give accurately the number of households in their area of supply, but from information received it would appear to be in the neighbourhood of 39,000. They had practically no specially designed coke grates in Ipswich. In other words, their coke would burn normally in coal fireplaces. The number of these household open fires lighted by gas was small, but was increasing.

Gas Purification.

Information was asked as to the capacities of the main purifiers and catch boxes. The large boxes were each 60 ft. by 30 ft. by 5 ft. 1½ in. with one oxide layer 2 ft. 9 in. in depth. The catch boxes were 50 ft. by 20 ft. by 5 ft. 1½ in. with a 2 ft. layer of oxide.

They had a safety sealpot placed at the inlet of the purifiers, connected to which was an electric alarm which operated in the exhauster house. 80° F. was considered to be quite hot enough at the inlet of the purifiers, their average figure for 1937 being 67° F. The gas flowed downwards through the purifiers.

The boxes themselves were not heated, but received heat from the flow of exhaust steam through pipes in the purifier house. He could not say how much money was saved or otherwise by emptying the purifiers every four months, as they had always followed this procedure. He found their purifying costs were below the average of those undertakings shown in Field's Analysis. The naphthalene content of gas produced in continuous verticals was always low, and they got very little trouble on this account. The average figure was 3 grains per 100 cu.ft. at the works outlet.

Storage and Distribution.

Mr. Townsend's conjecture that it was the Ipswich practice to work in and out of the waterless holder was correct. At the same time Mr. Garrard was very glad to tell him that gum trouble on the district was unknown. They had a certain amount of a gummy deposit on the valve of the town governor periodically. By by-passing this governor they were able to remove the trouble in a few hours, and this was, at the most, an annual occurrence.

With regard to the tar in the waterless holder, if they decided to change it completely, it would be the first time since its erection. They had, of course, made the seasonal additions to and substractions from this tar year by year, but it had never yet been changed completely. With regard to the maintenance of the holder, the cost was certainly higher than it was some years ago. The observing of the voluntary rules for the safety and maintenance of waterless gasholders, issued by The Institution of Gas Engineers had contributed to this as had the recent rises in wages. The maintenance of the holder cost about three times as much as that of the ordinary water sealed holder, but it was well worth it.

With regard to the feeding of gas to the new Woodbridge holder, it was at present arranged that this should be controlled by the man in charge.

Mr. Townsend's conjecture that the by-pass road did not form a complete ring was scarcely correct. Actually, this road ran from the South-West to the East-South-East of Ipswich.

Swimming Pools.—The question was asked as to whether 70° F. was not rather a high temperature at which to maintain the water in the pools. He could only say that this was the figure required by the local authorities and as far as he knew it was regarded as the necessary temperature throughout the whole year.

The Institution of Gas Engineers

Additional Examination Results, 1938

This is a supplement to the List published on July 20, 1938:

Candidates Qualifying for Certificates in Gas Engineering (Manufacture) or Gas Engineering (Supply).

EXTERNAL CANDIDATES

Higher Grade Gas Engineering (Manufacture)

Class.	Name.	Town.
Second	Wilkinson, J. H.	Morecambe

Ordinary Grade Gas Engineering (Manufacture)

Class.	Name.	Town.
Second	Bannister, J. A.	Leeds
,,	Holland, J.	Stockport

Higher Grade Gas Engineering (Supply)

Class.	Name.	Town.
First	Reid, A. C.	Leeds
Second	Crosby, G. H.	Bristol
,,	Witt, A. L.	London

Ordinary Grade Gas Engineering (Supply)

Class.	Name.	Town.
First	Blake, C. G. N.	Bournemouth
Second	Budden, F. W.	,,
,,	Donaldson, R.	London

INTERNAL CANDIDATES

Higher Grade Gas Engineering (Manufacture)

Class.	Name.	Centre.
First	Cooper, H. G.	Manchester
,,	Grundy, J. M.	,,
,,	Lord, J. K.	,,
,,	Smith, J. F.	,,
,,	Stubbs, J. A.	Wrexham
,,	Wright, S. E.	Newcastle-upon-Tyne
Second	Coates, H. R.	Manchester
,,	Farnworth, K.	,,
,,	Hogg, J. C.	,,
,,	Kettlewell, H.	,,
,,	Royden, G.	Glasgow
,,	Wroe, J. A.	Manchester

Ordinary Grade Gas Engineering (Manufacture)

Class.	Name.	Centre.
First	*Blinkhorn, A.	Manchester
,,	Eddlestone, T.	,,
,,	Hall, G.	,,
,,	Santley, R.	,,
,,	Slater, L.	,,
,,	Ward, H.	,,
Second	Clark, C.	,,
,,	Foster, H.	,,
,,	Handley, G. E.	,,
,,	Tooby, C. B.	,,

* With Distinction.

Higher Grade Gas Engineering (Supply)

Class.	Name.	Centre.
First	Bremner, J. R.	Westminster
,,	Hedges, H. R.	,,
,,	White, J.	Birmingham
Second	Whitehead, H.	Huddersfield

Certificate in Gas Supply

Class.	Name.	Centre.
Second	Naylor, H.	Bradford

Ordinary Grade Gas Engineering (Supply)

Class.	Name.	Centre.
First	Ashton, J. E.	Manchester
,,	Meir, S. R.	Stoke-on-Trent
,,	*Newsome, M.	Blackpool
Second	Broadbent, R. S.	Manchester
,,	Harrison, G.	,,
,,	King, F. H.	,,
,,	Lawton, J.	,,
,,	Plumpton, R. R.	Westminster
,,	Rigby, J. H.	Manchester
,,	Wilson, N. D.	,,

* With Distinction.

Ordinary Grade (Single Subject) Examination in Gas Engineering (Supply) to qualify to sit for the Diploma Examination in Gas Engineering (Manufacture)

Class.	Name.	Centre.
First	*Bramhall, R. J.	Manchester
,,	Hogg, J. C.	,,
,,	Law, R. K.	,,

* With Distinction.

New Glover-West Carbonizing Plant at Largs

BY 1936 the summer peak loads at Largs were taxing the gas manufacturing plant to its full capacity. It was a gratifying position, but at the same time it emphasized the need for some preparation for future increases. The Town Council decided to modernize the works by putting in a complete new carbonizing plant, and later Mr. George Braidwood (Director, Engineer, and Manager of the Coatbridge Gas Company) was called in to report upon the various proposals submitted. Since the new scheme was to be carried out on a rather restricted works site it was essential that the lay-out should be such as to utilize the available ground area to the best possible advantage while allowing the maximum of space for extension. Vertical retorts were strongly indicated, and this was the type of plant adopted. But in placing a contract for an installation of Glover-West vertical retorts with West's Gas Improvement Company the Council were not wholly concerned with the technical requirements involved. They recognized that the addition of a prominent new structure to the town, particularly in close proximity to the principal shopping centre, was a matter of public interest. Smoke-free operation and a pleasing external appearance were considered to be as necessary to the plant as technical efficiency, and when, having adopted vertical retorts, the Council gave their approval to a turreted building of typically Scottish baronial character, they struck the happy combination of an economic industrial plant and an architectural asset to the district.

There are four Glover-West vertical retorts of the 50-in. new model, of silica construction and with the usual enlarged base for steaming, in the new carbonizing plant. They are placed side by side, but each retort is arranged as an independent and separately controlled unit, with a daily capacity rated at 106,000 cu.ft. when making gas at a calorific value of 450 B.Th.U. The total daily capacity of the whole installation is therefore 424,000 cu.ft. The retort house has been designed to accommodate a further two retorts, and additional space is available for occupation when the future gas requirements increase beyond this provision.

Two producers are installed, one supplying the fuel-gas requirements of the retort bench while the other acts as a standby. Being of the pressure type fitted with West multi-nozzle blowers delivering to the underside of the grate a constant ratio of steam to air, they facilitate the use of breeze and small coke for fueling the plant, and they permit a regulated supply of producer gas to suit variations in coal throughput. Coke for the producers is taken in bogies by the lift to a storage compartment lined with hard bricks to resist wear.

The mechanical gear for coke extraction at the base of each retort is driven by two Sissons totally enclosed steam engines, one in operation and one as standby. The installation is equipped with plant to recover the heat of waste gases for steam-raising with a Spencer-Bonecourt horizontal natural-draught boiler.

Results obtained on the new installation under normal working conditions during two periods of observation are given below:

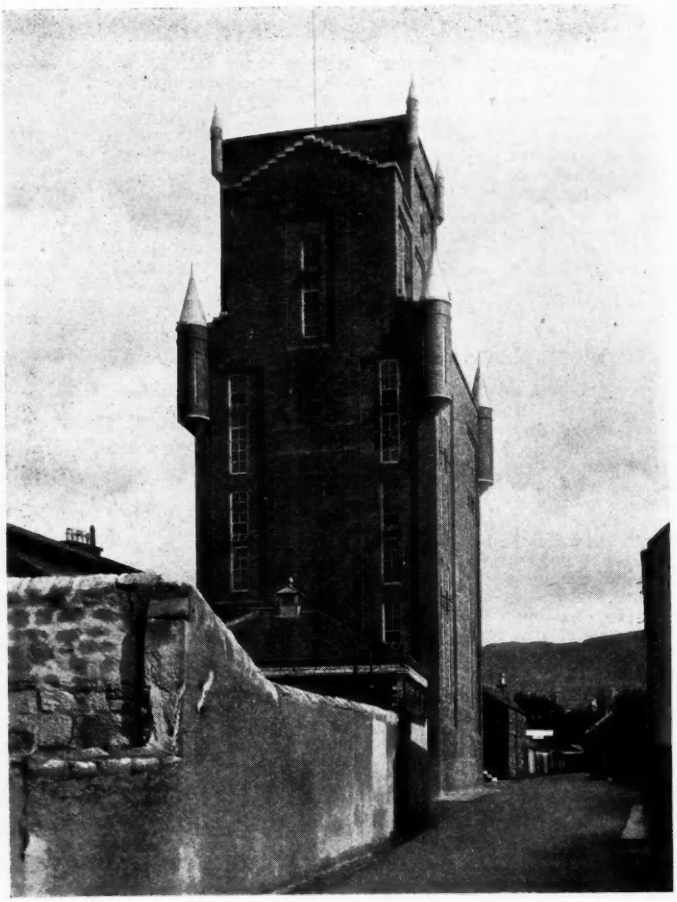
No. 1 COAL.

Duration of observed period	3¼ days
Class of coal carbonized	Ayrshire double nuts
Weight of coal carbonized	48 tons 5 cwt.
(Bunkers empty at commencement and completion of period.)	
Total gas made	859,700 cu.ft.
Gas made per ton of coal carbonized	17,817 cu.ft.
Average calorific value (declared value 450)	451·1 B.Th.U.
Therms per ton	80·39
Total coke made	28·23 tons
Coke made per ton of coal carbonized	11·70 cwt.

No. 2 COAL.

Duration of observed period	2 days 18 hours
Class of coal carbonized	Ayrshire doubles
Weight of coal carbonized	40·15 tons
Total gas made	711,500 cu.ft.
Gas made per ton of coal carbonized	17,740 cu.ft.
Average calorific value	453·3 B.Th.U.
Therms per ton	80·46
Total coke made	24·15 tons
Coke made per ton of coal carbonized	12·06 cwt.

The heaviest demands made on the new plant to date were on July 18, 1938, when the load ranged from 24,000 down to 4,000 cu.ft. per hour. The adjustments by which these wide variations were met indicate the great flexibility of the installation.



The Striking Turreted Building in which the New Glover-West Carbonizing Plant at Largs is Housed.

THE INAUGURATION CEREMONY.

The new plant was formally inaugurated on Oct. 27 when a large company of Gas Engineers inspected the plant and were afterwards entertained at lunch in Largs Hills Hydropathic.

Provost John Lindsay, of Largs, presided, and was supported by Sir Frederick J. West; Mr. Ernest West; Mr. H. A. Aitken (Leven), President of the North British Gas Managers' Association; Mr. G. Braidwood (Coatbridge); Mr. David Fulton (Helensburgh), President of the Waverley Association of Gas Managers; Mr. J. R. Lockie (County Clerk, Ayr); the Earl of Glasgow (County Convener); Councillor A. T. Buchanan (Convener of the Largs Gas Committee); Mr. William Marshall (General Manager, Largs Gas Department); Bailie John Robertson (Senior Magistrate); and Councillor Mrs. Morris.

Proposing the toast of "The Town and Trade of Largs," Sir FREDERICK J. WEST said the toast would be received with sincerity and enthusiasm. Largs catered for people who had retired from industry and commerce and catered for them very well. He had visited Largs some sixteen years ago and since then had seen a vast improvement in the town. Largs had a beautiful setting, whether viewed from the hills or from the steamer. He had seen some of the finest views in the world—at Sydney, Wellington, Hong Kong, Cape Town—and he considered that they had laid out their beautiful town splendidly and had provided amply for their visitors. The Town Council could claim to have done a good job for their ratepayers and to have created a civic pride in the activities of the Burgh. The late Lord Asquith coined a phrase regarding a Balliol College man having "the tranquil consciousness of effortless superiority" and that phrase could be applied to Largs. Their citizens should be grateful to their Councillors for the good work they had done. Public administrators to-day got more criticism than thanks but this country still possessed the finest example of local administration and government in the world. He had studied this question during his travels and the voluntary and disinterested services of their local

authority members were the envy of the whole world. He coupled the toast with the name of Bailie John Robertson, the Senior Magistrate of Largs.

Bailie ROBERTSON, replying, said that the complimentary remarks of Sir Frederick, coming as they did from one who had had a long experience in council work, were greatly appreciated. They were gathered together to celebrate the inauguration of their new gas-works plant. He had not heard one ratepayer deny that they had put up a magnificent building. It was only indicative of the further improvements they contemplated. The carbonizing plant was the principal item but they had other extensions and improvements in view. Their endeavour was to make Largs the foremost coast resort in the West of Scotland. Every member of the Council was of the same opinion.

Proposing the toast of "The Largs Gas Undertaking," Mr. H. A. AITKEN said they had happy recollections of the recent Conference held in Largs by his Association. Everyone who visited Largs Gas-Works that day would agree that both Largs Town Council and West's Gas Improvement Company were to be congratulated—the former on their enterprise and the latter on the fine vertical retort plant they had installed. The plant conformed to the best practice and embodied all the latest improvements gleaned from the firm's wide experience in the erection of such plant. The building formed a handsome new departure from the general utilitarian aspect which hitherto had been generally adopted in gas-works. It was a noble edifice.

Councillor ANDREW T. BUCHANAN said that in the new gas plant and the way it was housed they had seen something unusual. There was not another plant like it in Great Britain. During the construction of the new plant and building the workers had experienced bad weather, and it was to their credit that they had succeeded in having the plant ready for use for their peak period in July. It was a great achievement on the part of the West's Gas Improvement Company.

Replying to the toast of "The Visitors," proposed by Bailie T. GOURLEY Mr. GEORGE BRAIDWOOD said they had learned, at the recent North British Association Meeting, what ideal hosts they had in the Provost of Largs and his colleagues. They had come back that day to join with them in celebrating the opening of their new carbonizing plant. When the design of the building was seen on paper someone doubted if it could be reproduced in bricks and mortar. The result spoke for itself. They had modernized their plant and commenced a new era.

Mr. D. FULTON proposed the health of "The Chairman," Provost LINDSAY replying.

Midland Junior Gas Association

Visit to West's Gas Improvement Company, Ltd.

On Thursday, Oct. 20, a party of 35 members of the Midland Junior Gas Association visited the works of Messrs. West's Gas Improvement Company, Ltd. The party was welcomed by Mr. E. West, Mr. J. West, and Mr. R. Glover, and the early part of the afternoon was spent inspecting the works. Later a selection of films was shown of Sir Frederick J. West's travels abroad. The members were afterwards entertained by the firm at tea.

The PRESIDENT (Mr. A. W. Attwood), in voicing the thanks of the members, commented on Sir Frederick's recent William Young Memorial Lecture and the evidence of his goodwill towards the work of the Junior Associations. The SENIOR VICE-PRESIDENT (Mr. W. N. Smirles) seconded the vote of thanks. Sir FREDERICK WEST, in reply, expressed his pleasure at being present, and hoped that the Association would invite him to one of their meetings at a later date. Mr. E. WEST also briefly replied.

Scottish Juniors Visit Firebrick Works

On Saturday, Oct. 22, members of the Scottish Junior Gas Association (Western District) were the guests of the Douglas Firebrick Company, Dalry, Ayrshire.

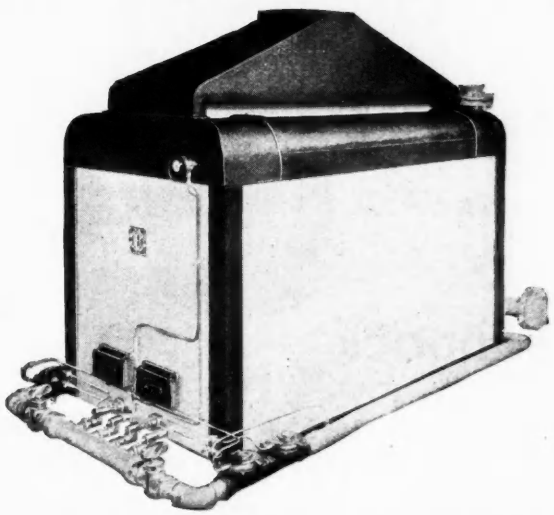
The members were welcomed by Mr. Richmond Douglas, a Director of the firm and a son of its founder, who showed by means of a scale model how the works would appear when the extensions at present being carried out were completed. Thereafter the visitors divided into small parties, and were conducted round the works. The plant for the treatment of the clay was first inspected, and thence the parties passed through the shops in which the hand-made bricks are produced to a well-equipped joiners' shop in which the many thousands of moulds, used in the production of the various shapes, are made.

Much interest was taken in the tunnel driers and kilns, where the gradual heating up and cooling again, the system of firing, the rate of travel of the carriages, and the methods of manipulation and control were all examined.

After a thorough inspection of the works and its products the members were entertained at tea in the works canteen.

Mr. N. C. STURROCK (President of the Association) expressed to Mr. Douglas the indebtedness of the Association for the hospitable manner in which the members had been entertained.

POTTERTONS' PATENT GAS WATER HEATERS for CENTRAL HEATING and HOT WATER SUPPLY



Our "EMPEROR" and "REX" Boilers are exhibited on the Stand of The British Gas Federation at The Woman's Fair, Grand Hall, Olympia, November 2nd to 29th.

THOMAS POTTERTON (Heating Engineers), LTD.

Cavendish Works, Ravenswood Road, Balham, LONDON, S.W. 12

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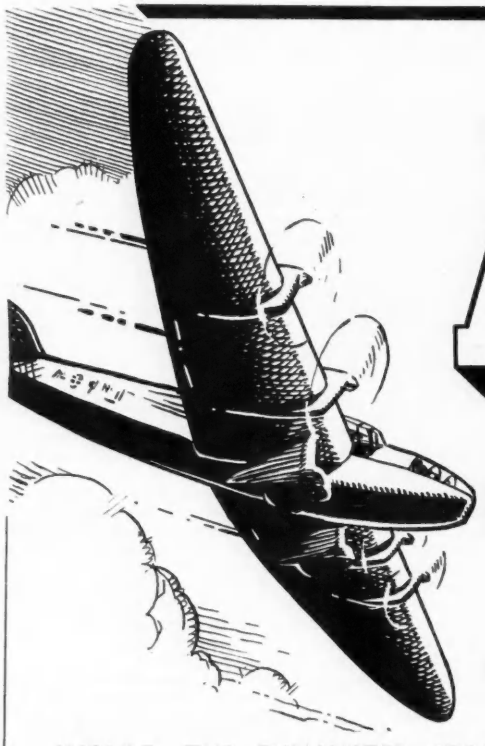

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BRADDOCK'S

OIL SEALED

AUTOMATIC RELIEF VALVE

(PATENT APPLIED FOR)

SHOULD THE EXHAUSTER STOP OR A BLOCKAGE OCCUR IN THE WORKS MAIN, VALVE RELIEVES PRESSURE IMMEDIATELY AND SEALS AGAIN AUTOMATICALLY WHEN NORMAL CONDITIONS RETURN.
CAN BE SET TO "RELIEVE" AT ANY PRE-DETERMINED PRESSURE.

AUTOMATIC IN ACTION

ROBUST AND RELIABLE

PRICES AND PARTICULARS

APPLY TO **J. & J. BRADDOCK**
(BRANCH OF METERS, LTD.)
45/47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.1
GLOBE METER WORKS, OLDHAM, AND
49/51, ABLOW STREET, WOLVERHAMPTON

Braddocks are Best

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Oct.* 31.

There are one or two alterations to record in the values of Tar Products, to-day's prices being as follows:

Pitch nominal at about 31s. per ton f.o.b.
Creosote, 4⅛d. to 4¼d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Oct. 31.

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 4¾d.; low gravity, 4½d. to 4¾d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080 5¼d. to 5½d.; heavy tar oil, gr. less than 1,080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Oct.* 29.

Little or no change can be reported. Trading continues difficult and prices are therefore rather unstable.

Crude gas-works tar.—Actual value is about 37s. to 38s. per ton *ex* works in bulk.

Pitch is available in substantial quantities at round about 22s. 6d. to 23s. 6d. per ton f.o.b. for export, and about 20s. to 22s. per ton in bulk for home trade.

Refined tar is quoted freely at 3¾d. to 4d. per gallon in the home market and round 3d. per gallon for export, both into buyers' packages at makers' works.

Creosote oil.—Enquiries are scarce with prices as under: Specification oil, 4½d. to 4¾d. per gallon; low gravity, 5d. to 5½d. per gallon; neutral oil 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—No business of any consequence has taken place and values are easy as follows: Pale, 97/99%, 1s. 4d. to 1s. 6d. per gallon; dark, 97/99%, 1s. 2d. to 1s. 4d. per gallon; and pale, 99/100%, 1s. 6d. to 1s. 10d. per gallon; all according to quality, ex works in buyers' packages.

Crude naphtha is steady at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—Supplies can be secured at 1s. 3½d. to 1s. 4d. per gallon for 90/160 grade and round 1s. 1d. to 1s. 1½d. per gallon for 90/190 heavy naphtha.

Motor benzole is unchanged at 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. to 9s. per gallon and 90/140 grade is 9s. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole ..	0	9½	to 0	10		per gall. at works
Motor " ..	1	3	" 1	3½		" " "
90% " ..	1	4	" 1	4½		" " "
Pure " ..	1	8	" 1	8½		" " "

Contracts Advertised To-Day

Mainlaying.

Colwyn Bay Gas Department. [p. 366.]

Steel Mains.

Colwyn Bay Gas Department. [p. 366.]

Dividend Announcement

Meters, Ltd.—For the current year: On the Preference Stock at the rate of 5½% per annum. On the Ordinary Stock at the rate of 5% per annum. The Dividend Warrants will be posted on Nov. 14.

Rugby Capital Issue

The Directors of the Rugby Gas Company are offering for sale by tender £26,000 4½% preference stock at a minimum price of *par*. The last time for the receipt of tenders is 11 a.m. on Friday, Nov. 11. Prospectuses and tender forms can be obtained from the Company's office, Railway Terrace, Rugby, and from Messrs. Seymour, Pierce, & Co., 6, Lothbury, London, E.C. 2.

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

REPEAT ORDERS

ARE NOW IN HAND FOR EXTENSIONS TO GLOVER - WEST VERTICAL RETORTS FOR THE FOLLOWING UNDERTAKINGS

- **Bedford**
- **Bergen**
- **Blackpool**
- **Coatbridge**
- **Coventry**
- **Dublin**
- **Hull (East)**
- **Leeds**
- **Le Mans**
- **Motherwell**
- **Oldbury**
- **Perth**
- **Romford**
- **Slough**
- **Sydney**

GLOVER-WEST VERTICAL RETORTS

. . . for coal carbonization with the advantages of modern scientific control

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C. 2

GAS STOCKS AND SHARES

The cheerful tone at the close of the previous week continued in evidence last week, and a larger volume of business was recorded on the Stock Exchange. It is unfortunate that, although the international situation appears more settled, affairs in this country are now holding up the return to greater activity by reason of the uncertainty regarding the extra financial burdens which may become necessary on account of the speeding up of rearmament. Gilt-edged stocks were well supported and some fractional gains followed, while home rails received more enquiries than for some time past and several stocks made good recoveries. The industrial section also had a good following, but oils and rubbers were somewhat neglected. Gold mining shares opened without support, though business developed towards the end of the week.

A little more activity was displayed in the Gas Market, but the extra demand was not sufficient to affect prices, the majority of which have shown little change during the past few weeks. In the Official List, Alliance and Dublin ordinary recorded the highest rise with a 3½ points gain to 140½, while the 15 point margin of the Company's 4% debenture stock has been brought into line with similar stocks with a quotation of 95-100. Commercial 3¼% debenture hardened 2 points to 99½. The only loss of any note was a drop of 5 points to 132½ in Malta and Mediterranean. On the Provincial Exchanges Bristol and Sheffield ordinaries both moved up 1 point.

Except during the recent crisis period, the majority of gas "ordinaries" are now quoted at the lowest levels reached for the past five or six years. Having regard to the fact that during these years dividends, with few exceptions, were maintained or increased, it is rather surprising that values have depreciated to such an extent during the current year and the yields now obtainable are exceptionally high for the security offered. It is true that the extra cost of coal may be prejudicing some investors against gas securities, but, although this increased charge is a serious factor, it will doubtless be met by economies under other heads of expenditure and by passing on some of the burden to the consumer.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	138—143	+3½
374,000	June 20	4	4	Do. 4 p.c. Deb.	95—100	−3
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/−	...
444,389	,,	§−/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/−	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/−	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb.	93—98	...
560,070	Aug. 22	7	7	Barnet Ord. 7 p.c.	157—162	...
300,000	Oct. 10	1/9⅜	1/4⅜	Bombay, Ltd.	24/—26/−	...
180,435	Aug. 22	9⅜	9⅜	Bournemouth sliding scale ...	195—205	...
640,407	,,	7	7	Do. 7 p.c. max. ...	152—162	...
495,960	,,	6	6	Do. 6 p.c. Pref. ...	130—135	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	75—80	...
312,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	120—125	...
855,000	Sept. 19	8	7	British Ord.	135—140	...
100,000	June 3	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Sept. 19	2/−	2/−	Colombo Ord....	1⅝—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.... ...	22/6—24/6	...
739,453	Oct. 10	−/11·48	−/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/−	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	22/6—24/6	...
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84	...
140,000	,,	—	§13/4	Do. 4 p.c. Red. Pref.	95—100	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	70—75	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	...
200,000	,,	—	§30/2	Do. 3¾ p.c. Red. Deb.	97—102	+2
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div. ...	100—105	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	113—118	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c.	95—100	...
186,155	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B' ...	19/—21/−	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅔	5⅔	Gas Light & Coke Crd. ...	22/—24/−a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	76—81	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	97—102	...
2,993,000	July 4	—	3¾	Do. 3¾ p.c. Red. Pref. ...	98—103	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb....	77—80	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb....	110—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb....	109—112	...
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb....	93—98	...
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2⅝	‡1/−	Hong Kong and China Ord. ...	¾—1	...
213,200	Aug. 8	6	5⅝	Hornsey Con. 3¾ p.c ...	97—102	...
5,600,000	Oct. 24	12	8	Imperial Continental Cap ...	109—114*	−3
223,130	July 18	3¾	3¾	Do. 3¾ p.c. Red. Deb. ...	87—92	...
235,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169	...
11,751	Aug. 22	10	8	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
45,000	May 23	†10	†10	Malta & Mediterranean ...	130—135	−5
				Metropolitan (of Melbourne)		...
392,000	Oct. 3	5¼	5¼	5¼ p.c Red. Deb.	97—100	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
390,076	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	95—100	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
125,000	July 1	3½	3½	Do. 3½ p.c. Red. Bds.	95—98	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Oct. 24	†7	†9	Oriental, Ltd.	145—150*	−2
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	140—150	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	90—95	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Sept. 19	−/10½	−/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	127—132	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	21/—23/−	...
871,636	,,	−/10½	−/10½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/−	...
450,000	Aug. 8	4	4	Do 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	103—106	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	125—130	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	95—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	75—80	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	107—112	...
600,000	,,	—	§31/−	Do. 3¾ p.c. Red. Deb. ...	97—102	...
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	113—118	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	108—113	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	95—100	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	90—95	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	113—118	...
250,000	,,	4	4	Do. 4 p.c. Deb.... ...	95—100	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Sept. 19	8‡	9⅜	S. Western Gas & Water Ord.	16/—18/−	...
160,523	Oct. 10	−/10½	−/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/−	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	105—110	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	125—130	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	115—120	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
334,615	June 3	4	4	Do. 4 p.c. Deb. ...	95—100	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—101	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	17/—20/−	...
1,051,280	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/—21/−	...
762,241	,,	−/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/−	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/−	...
1,066,186	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
375,689	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	125—130	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	95—100	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	113—118	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
400,000	,,	—	§25/−	Do. 3¾ p.c. Red Deb.	97—102	...
558,342	Aug.	7	6⅞	Watford and St. Albans Ord.	128—133	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	110—115	...
200,000	,,	—	16/8§	Do. 4 p.c. Red. Pref.	95—100	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
200,000	,,	3½	3½	Do. 3¼ p.c. Red Deb.	90—95	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Oct. 28.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106	..
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	..
31,035	Aug. 22	–/4½	–/4½	Associated Utilities 4 p.c. Pref.	16/—18/–	..
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	..
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	..
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	..
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	..
37,440	Aug 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	..
125,970	,,	7	7	Do. 7 p.c. max.	133—138	..
39,025	,,	5	5	Do. 5 p.c. max.	97—102	..
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	..
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	..
130,000	June 20	4	4	Do. 4 p.c. Deb.	95—100	..
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	..
198,000	,,	7	6	Do. 'B' 3½ p.c.	114—119	..
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	..
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	..
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,600	Sept. 5	9	8	Guildford Cons.	163—168	...
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112	...
68,250	June 3	5	5	Do. 5 p.c. Deb.	107—112	...
156,600	Aug. 22	7½	7½	Hampton Court Cons. ...	131—136	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	90—95	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Sept. 5	8½	8½	Luton Cons. 'A'	153—163	...
107,960	Sept. 19	5½	4	Mid Kent Ord.	8½—9½	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Sept. 5	6½	7½	Redditch Ord....	118—128	...
164,850	Aug. 8	8	8	Romford Ord....	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	112—117	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept. 5	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/–	...
28,866	Sept. 5	4½	4½	Do. 4½ p c Red. Cum. Pref.	18/—20/–	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Rd. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	117—119	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	112½—114½	+1
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	100—102	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max....	97—99	...
13,200	Sept. 19	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	12⅞—13⅜	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11½—12½	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11½—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	100—102	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	109—111	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.... ...	121—123	...
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,260	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—163	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	89½—90½	...
2,061,315	Aug. 8	5⅝	5	Newcastle & Gateshead Con.	22/3–22/9a	+3d.
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	+½
277,285	Oct. 24	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½*	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—136	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—143	...
55,000	June 3	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
60,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 28.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	140—142	+1
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

a The quotation is per £1 of Stock. * Ex div.

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